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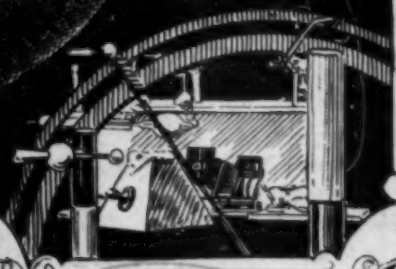
THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.



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THE AMERICAN X-RAY JOURNAL

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Address Communications to Dr. H. Preston Pratt, Managing Editor, Masonic Temple, Chicago.

PROFESSOR ARTHUR W. GOODSPEED
President American Roentgen Ray Society for 1903.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XI. ST. LOUIS AND CHICAGO, DECEMBER, 1902. No. 6.

Equi-Potential Surfaces in the X-Ray Field—Their Production and Utilization *

BY JOHN T. PITKIN, M. D.

Soon after the discovery of the x-ray by Professor Roentgen in 1895, the speaker caused to be installed in his office a Holtz static machine having eight revolving plates. During the seven years that have intervened the number of revolving plates has been gradually increased, till today it is forty-six.

Focusing or Jackson-Crookes tubes, which were then about the size of a large thumb, are now the size of a small arc light globe. Spark gaps, at first but one or two, can now be increased to forty or fifty in number. Improvements in all the details of construction of the x-ray apparatus have been commensurate. It is thus from a practical experience with generators of varying size and construction that I am able to draw the following conclusions:

For a one wheel static machine to produce a quantity of x-radiance equal to another machine having forty-six revolvers, it must be operated forty-six times as fast and sustain no additional loss of current thru the atmosphere or upon the neutralizing system in consequence of incidentally increased voltage or tension.

The electrical loss in air can be estimated by the degree to which a glow lamp, held in the hand of the operator with its base toward the apparatus, is lighted, by the charging of a Leyden jar held in the same manner, or the precipitation of elementary carbon upon the exterior of the Crookes tube and other objects of the apartment with which it is immediately surrounded. The loss upon the neutralizing system can be seen by inspection of its collecting combs after the room has been darkened.

The greater the number of plates in the generator the (1) larger is the volume and the steadier and more penetrating the x-ray field, (2) the lower the tension or voltage, (3) the less the loss of current, (4) the larger and softer the tube which can be operated, (5) the more concentrated the cathode rays and (6) the longer lived the tubes. Conversely as the vacuum in a tube rises beyond a given point, the capacity of the tube decreases, a smaller machine can fully excite it, the rays are penetrating but attenuated, the kathode rays become more eccentric and the electrical loss is greatly augumented.

I prefer the static generators to the sparking coils, because their discharge is continuous, direct and uniform; with them we work upon a primary, not a secondary, tertiary, or quaternery circuit. They are less affected with induction complications, do not break down from internal discharge, have no make and break to fail to operate, and cause less strain upon the tubes, thru which their discharge is more concentric. They afford us an ever ready, never failing source of electrical supply.

It is one of the requirements for the generation of static electricity that a dielectric shall be interposed somewhere in

*Read before the American Roentgen Ray Society at Chicago, Dec. 10, 1902.

the circuit in order to create and maintain a difference of potential. The dielectric so employed is usually the air space between the discharging rods or the rarified air in the interior of the Crookes tube. If, within certain limits, the air spaces are increased in length or number, or the gas within the tube becomes more rare, while the generator maintains the same speed, then the volume and potential of the current will rise proportionately, causing the x-ray field to increase in volume and penetration. I am indebted to the writings of Nichola Tesla for my first knowledge that many small air gaps in simple series are superior to one long interval. He places several metallic buttons in a row between which the current is operated.

My improvement consists in a glass rod one foot long about the size of your little finger. This rod is made to project like a semaphore, horizontally outward and obliquely forward from the arm of the positive prime conductor, between the great ball and the handle of the discharging rod. Onto the glass rod are slipped several plain band brass rings which are made so that they can be moved freely inward to close or outward from each other to form intervening air gaps. When the brass rings are separated from each other and the current turned on, a beautiful cascade of sparks plays between them, nearly surrounding the glass tube on all of its exposed sections, and the generation of x-rays is greatly intensified.

With this spark gap multiplex very low vacuum tubes can be operated and wonderful therapeutic effects obtained. But as the vacuum in the tube rises the number of intervening spaces should be decreased proportionately, and the resistance of the tube employed in its reciprocal relation. A series of spark gaps, to be most effectual, must provide a disruptive, not a connective, discharge between the various sections. The brass rings can be moved to and fro upon the glass rod with an insulated pointer held in the hand of the operator, or one of the electrodes supplied by all the makers of static machines can be employed for that purpose.

If hard rubber is used as a support for the brass rings instead of glass, as described above, it will be oxidized by the current and the discharge become connective and irregular.

A properly excited Crookes tube should present a green or active and a dark or inactive hemisphere. Any deviation from this ideal condition represents wasted energy. If the operator faces the active hemisphere and looks thru a fluoroscope in front of which he holds vertically a sheet of glass in such a manner that he can only discern the shadow from its proximal edge, then the sheet of glass will indicate the direction taken by the rays which it obstructs between the Crookes tube and the observer's eye. If at equal distance from the tube he moves to the right and left, observing the same precautions, he will describe a semicircle with its convexity outwards, the same results will be obtained if holding the glass plate horizontally he moves upwards and downwards.

After several similar reckonings have been made at varying distances from the tube in the x-ray field of energy he will be able to determine the latitude and longitude of the rays, demonstrate their rectilinear and diverging course from the glass walls of the tube outwards into space, and map out with mathematical precision innumerable equi-potential surfaces.

In order to prevent distortion of the image and obtain correct localization of foreign bodies the fluoroscopic screen and photographic material should be made to conform to the shape of these equi-potential surfaces.

As the anatomical structures to be examined have by construction the desired shape *i. e.*, convex from side to side and convex from above downwards, why should

not the x-ray pictures of the inside of the human body be as free from distortion as the delineations of its exterior by the expert photographer?

Buffalo, N. Y.

Chicago, December 10, 1902.

At the annual convention of the American Roentgen-Ray Society now being held in Chicago, the following resolution was passed, after which W. E. Goldsborough, Chief of the Department of Electricity of the St. Louis Exposition, addressed the convention upon the invitation of the Chairman of the Executive Committee:

WHEREAS, The American Roentgen Ray Society, in convention assembled, has heard with satisfaction of the plans and purposes of the Department of Electricity of the World's Fair of St. Louis, 1904, to bring together a thoroly representative and advanced exhibit of Roentgen ray and electro-therapeutic apparatus,

Resolved, The American Roentgen Ray Society, being deeply interested in the success of the Roentgen ray and electro-therapeutic exhibits, extend to the Department of Electricity of the Exposition assurances of its cordial support, believing the plan and scope of the exhibits will meet the expectations and approval of the medical profession.

Following the excellent papers in our last issue by Dr. Clarence E. Skinner and Dr. W. B. Snow, we publish a report of some cases of cancer treated by x-rays by Dr. J. D. Gibson. Dr. Gibson's work shows some of the possibilities before us in even extreme cases, when thoro knowledge and practical skill are combined to devise the best forms of treatment. In fact, what is now most needed in x-ray therapy is a full report of the technique of the treatments that have failed to cure. A careful study of these would probably disclose some of the reasons for the failures.

How to Treat Cancer.

BY H. VALENTINE KNAGGS, M. R. C. S., L. R. C. P., LONDON, ENG.

WHAT CANCER IS.

In nature the animal and vegetable kingdoms stand in direct antagonism to each other, and what the one builds up the other destroys.

The vegetable gives off oxygen and absorbs carbonic acid, water, and ammonia from the air and soil to produce various food products. The animal, feeding on these food products, reverses the process. It absorbs oxygen, burns up the food, and returns the carbonic acid, etc., to the earth and air.

When either animals or vegetables are deprived of sunlight, pure air, and pure food, and have mainly to rely for their nutriment on a tainted atmosphere and septic foods, they each tend to revert to the opposite kingdom.

The vegetable becomes less highly organized and simulates in time the fungus, while the animal becomes tuberculous or cancerous. The fungus absorbs oxygen and emits carbonic acid, and is really a vegetable usurping animal functions. In the same manner animals become cancerous when their structures usurp the functions of the vegetable.

HOW CANCER IS PRODUCED.

Cancer is a fungoid growth, becoming a pseudoparasite, growing upon and at the expense of the animal tissues upon which it flourishes.

Cancer is produced in a system which contains an excess of unoxidizable lowly-organized nitrogenous matter, just as the vegetable fungus grows in the same kind of soil.

The unoxidizable material may be introduced thru the assimilation of tainted, salted, and fermented foods, by toxin elements in the blood affecting and fermenting retained nitrogenous waste, by the constant inhalation of stagnant atmospheres filled with molds and yeasts, or by

the absorption of the poisonous products of retained excreta, as in constipation.

The conversion of the unstable nitrogen into cancer is promoted by the natural retrograde action which takes place in certain organs and tissues as a result of age, and also as a consequence of a syphilitic, tuberculous, or other cachexia. It is further encouraged by an excess of carbonic acid in the system and a diminished absorption of oxygen, resulting from neglect of exercise, inadequate respiration, prolonged staying-in-doors, and the use of alcoholic and carbonated mineral waters. Cancer growth is also promoted by the free use of common salt. This is analogous to the fact that gardeners water mushroom beds with warm salt solutions in order to produce a copious crop.

ELECTRICAL TREATMENT.

To treat cancer successfully it is necessary to first destroy the life of the tumor and cause absorption of the growth itself by the use of suitable light-heat baths, x-ray exposures, and high frequency currents. All of these forces, in practice, have their various uses in individual cases, but the "High Frequency" apparatus, on account of its simplicity and absence of dangerous after effects, is probably the most advantageous for routine work.

Indeed, as the "High Frequency" treatment becomes more generally known and its merit recognized, it is likely to largely replace x-ray exposures and other methods of administering powerful electrical currents.

"High Frequency" acts best when used in immediate conjunction with the light-heat bath. The flow of the current is facilitated by the moist well-acting skin. The light of the bath also aids the treatment.

The efficacy of electricity is due to the action of a very powerful electrolysis. The ozone, liberated in the tissues subjected to its influence, destroys the lowly organized life of the malignant growth.

The gradual softening down and disintegration of the tumor under *repeated* applications of these electric forces is followed by a rise of temperature, an increased production of tissue waste, marked activity of the various excretory organs, and the formation of purulent debris. General treatment to supplement the purely electrical measures must therefore be vigorously pressed to ensure permanent results.

ADMINISTRATION OF SULFID OF CALCIUM.

The septic condition of the blood and the tissues, upon which the cancerous cachexia depends, can usually be remedied by the persistent use of sulfids and especially of the sulfid of calcium.

The drug is easily given in the form of 2½-grain compressed, sugar-coated tablets. The daily dose should be from twenty to forty grains. These large doses are, with some few exceptions, readily tolerated by the system and can be continued, with occasional short intermissions, for an indefinite period of time. The cancerous condition establishes a tolerance of the drug and patients will improve materially, both in their health and appearservers have used sulfur in various forms for the treatment of cancer, and in some hands it has met with a considerable measure of success.

In 1880 Professor Clay, of Birmingham, startled the world by his discovery of what was supposed to be a cure for cancer. His remedy consisted of a mixture and pill containing sulfur and Chian Turpentine. The mixture, in addition to the Chian Turpentine, contained 2½ grains of sulfur to each dose and was to be taken three times a day. The pills contained 3 grains of the Turpentine and 2 grains of sublimed sulfur, of which two were to be taken every four hours. If these formulæ are worked it will be seen that the patient was taking quite 30 grains of sulfur daily, which is an appreciable daily dose.

In 1882 Dr. Barton pointed out the value of sulfid of calcium in cancer after operation, given in doses of ½ to 3 grains. He reported three cases treated after operation, and the principal point which he noticed was the rapid way in which the patients gained strength and flesh. Dr. Barton further reported two well anthenticated inoperable cases of cancer in which this remedy caused the disease to disappear. He gave it in doses of 1/3 of a grain, increasing to 3 grains three times a day.

The writer has a number of cancer cases where the tumor has been removed which are taking this remedy with excellent results in doses of ½ to 3 grains three times a day. In only one case has there been recurrence, after eight years of good health, and then the uterus became affected after an excision for mammary cancer. The recurrence was attributable to the prolonged strain of nursing a sick husband suffering from phlebitis, in which the wife had very little rest by night and seldom left the house for fresh air for weeks together. Two of the worst cases still under observation, which were of a very virulent type in patients under 40 years of age and operated on many years ago, are at the present time in perfect health.

In cases where no operation has been performed it will greatly aid the electrical treatment if large doses of the sulfid of calcium are simultaneously given. Even if the electrical treatment is not available, the writer has seen very good results from the use of this drug in large doses.

FREE SKIN ACTION.

To promote rapid elimination of tissue waste and poisonous toxins generated by the growth (thereby assisting the work of the electrical and sulfid treatment), the light-heat bath or the ordinary Turkish bath should be resorted to.

The ideal bath for this purpose is that in which the heat is generated by electric incandescent lamps, of which there are several forms in use. In addition to a combustion-free heat there is added the curative element of light. As this kind of bath is unfortunately beyond the means of many patients, the ordinary portable Turkish bath, now sold at a very low price, will answer the same purpose, and can be used at the patient's own home at a time when it is most convenient to use it. The portable vapor baths have the great advantage that the user is not breathing a vitiated air, as would be the case in the public baths.

As a preventive measure after operation for cancer, one or two baths weekly will suffice to retarl or prevent recurrence. In inoperable, or early operable types, or in cases in which recurrence has taken place, it will generally be found advisable to order the baths to be taken daily or on alternate days, either when the patient retires to bed or on rising in the morning.

HYGIENIC TREATMENT.

Hygienic treatment for cancer should be directed towards increasing respiratory efforts, and in securing an unlimited supply of pure vital air. It would be best to have the dwelling-house built on high ground, sheltered from cold winds, and at a distance from marshes, rivers, and woods. The house must be sanitary, its drainage perfect, and preferably of modern construction. Cancer often seems to haunt old houses in which the woodwork and other parts are decaying, or are on the verge of decay. As much moving vital air as possible should be introduced into the house itself and all windows should be widely opened, winter and summer, night and day, to let the rooms be thoroly ventilated. The air of rooms gets stale and tainted with moulds and yeasts if not frequently changed and kept moving.

Regular exercise should be taken, short of fatigue, in the fresh air. If patients are unable to walk they must sit or lie in the open during a considerable part of the day. Deep breathing should be regularly

practiced by all sufferers and various mechanical exercises which increase the breathing capacity of the lungs systematically persevered with.

DIETETIC MEASURES.

The general dietetic treatment resolves itself into one of training back the patient to a more highly organized state by means of a healthy and natural method of living. The action of the kidneys should be encouraged in order to remove accumulating tissue waste and injurious toxin products, as well as to regularly flush the entire system. This can be effected by drinking freely of hot distilled water, oxygen water, lemonade made with fresh lemons, coffee, and other similar beverages, and should be combined with the plentiful use of potassium salts; which are best obtained from sound, ripe, succulent fruits and fruit juices. Constipation must be corrected by the use of fresh or dried fruits, stewed or otherwise, and coarse wheaten breads, or grains made into porridges, etc. This should be supplemented in obstinate cases by suitable vegetable aperients such as syrup of figs or extract of Cascara Sagrada, or even by ordinary or electric-vibration massage to the abdomen.

Fruits, nuts, and well dextrinized grains, properly cooked vegetables, biscuits, whole-meal bread made without yeast, or well toasted or baked yeast-made bread, should constitute the staple articles of daily diet. These should be combined with new laid eggs, milk, cream, and fresh butter. Vegetables should be cooked in their own juices with a minimum of distilled water and without salt or soda, so that the valuable potassium salts contained in them should not be lost. Vegetables are best prepared for the table in a steam cooker. Flesh foods should be eaten very sparingly, if at all, and all beef-teas and meat extracts discontinued. In order to cut off the supply of unoxidizable nitrogen or of anything likely to feed a cancerous condition, all cured, fermented, salted, and tainted foods, as ham, bacon, dried or tinned fish, sausages, game, cheese, pickles, vinegar, etc., should be excluded from the dietary.

Alcoholic or carbonated waters are also to be avoided; sugar and salt should be eaten very sparingly.

CONCLUSION.

The best way to ensure the absolute efficiency of these measures would be to treat the patient in an Open-Air Sanatorium, when the entire treatment here suggested could be closely and carefully watched daily.

It is highly probable that in a few years' time Cancer Sanatoria will be universally established thruout the country on lines somewhat similar to those at present working for Tuberculosis. The chief alteration would be in the matter of the diet.

The writer has attempted to carry out the treatment on a small scale in general practice, and the results so far have been very encouraging.

Program of the Chicago Meeting of the American Roentgen Ray Society.

WEDNESDAY, DECEMBER 10.

MORNING SESSION, 9:30 O'CLOCK.

GENERAL BUSINESS.

READING OF ESSAYS.

1 X-Ray Physics,
T. PROCTOR HALL, M. D...CHICAGO, ILL.

2 Equal Potential Surfaces in X-Ray Field.
JNO. C. PITKIN, M. D...BUFFALO, N. Y.

3 Instantaneous Skiagraphy,
MIHRAN R. KASSABIAN, M. D., ...PHILADELPHIA, PA.

WEDNESDAY, DECEMBER 10.

AFTERNOON SESSION, 2:30 O'CLOCK.

PRESIDENT'S ANNUAL ADDRESS.

4 (*a*) Systematic Records,
(*b*) The Routine Use of the X-Rays,
M. J. WILBERT.....PHILADELPHIA.

5 Skiagraphy as an Art,
J. RUDIS-JICINSKY, M. D..... ....CEDAR RAPIDS, IA.

6 Results and Technique in Treating Epithelioma with X-Rays,
EMIL H. GRUBBE.....CHICAGO.

WEDNESDAY, DECEMBER 10.
EVENING SESSION, 8 O'CLOCK.

7 The Roentgen Ray as a Therapeutic Force, from a Clinical Standpoint, with Illustrative Cases.
JOHN B. MURPHY, M. D..CHICAGO, ILL.

8 Treatment of Three Cases of Cancer, One Case of Tuberculosis and Seven Cases of Rodent Ulcer and Lupus,
G. P. GIRDWOOD, M. D.MONTREAL, CAN.

9 The Technique of Treatment of Malignant Growths,
J. N. SCOTT, M. D...KANSAS CITY, MO.

THURSDAY, DECEMBER 11.
MORNING SESSION, 9:30 O'CLOCK.

GENERAL BUSINESS.

10 Radio-Therapy in Pulmonary Tuberculosis,
GORDON G. BURDICK, M. D., CHICAGO ILL.

11 X-Ray Treatment in Intra-Abdominal and Other Deeply Located Malignant Growths,
CLARENCE E. SKINNER, M. D.....
....NEW HAVEN, CONN.

12 Diagnosis of Calculi by X-Rays,
RUSSELL H. BOGGS, M. D.....
.....PITTSBURGH, PA.

THURSDAY, DECEMBER 11.
AFTERNOON SESSION, 2:30 O'CLOCK.

13 The Technique of X-Ray Therapy,
H. PRESTON PRATT, M. D., CHICAGO, ILL.

14 Result of Treatment of Guinea Pigs Affected with Tuberculosis by High Frequency Currents,
G. P. GIRDWOOD, M. D., AND C. HIGGINS, D. V. S.

Spark Gaps in Series.

Dr. Barnum of Los Angeles is credited in the daily press with the discovery that a multiple spark gap increases the efficiency of an x-ray tube.

All experienced x-ray workers regulate the spark gap or gaps in order to get the best results. The arrangement required varies with the nature of the current and the style and condition of the tube.

The x-ray photograph is a convenient scape goat in unpracticed hands. The serious error in x-ray diagnosis by which the stomach of Frank Buettner of Cleveland was opened to find some false teeth which were afterward found under his bed, is another indication that only medical experts can be relied upon for such work.

Practical X-Ray Diagnosis.

Prepared by J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Ia. Revised by M. U. Dr. Joseph Hoffman, Vienna, Austria.

A series of A B C teaching for workers in x-ray diagnosis and therapeutics, to be concluded in 20 lessons. Fully illustrated.

Lesson 18.
Fractures and Dislocations

The x-rays have become an accepted diagnostic agent in all fractures and dislocations, and on the other hand they may be used with their pictures as a basis of suits for damages for malpractice, which factor has deterred many surgeons from using this means of verifying a diagnosis as often as they should. This peculiar antipathy is being overcome, however, by the knowledge that an x-ray picture of fractures or dislocations must be made by an expert, and has to show the different layers of the muscles and the marrow cavity or internal structure of the bones in order to be considered good evidence, along with all the other clinical facts and factors in each individual case. So that, while a skiagraph is of undoubted utility as an aid to the correct diagnosis and treatment of a fracture, it is not of itself satisfactory proof in all cases of the existence of such injury, nor does it necessarily indicate the nature of an injury or the probable results. In medico-legal cases therefore it is much more wise and safe to ask for the negative as well as the positive print. A work on surgery which did not give full credit to the diagnostic advantages of the rays, especially in fractures and dislocations, would not be up to date. It is not necessary to more than mention their diagnostic value in honest and capable surgical hands. They are not only valuable in corroborating the status presens discovered by the usual methods of diagnosis, but at times by their aid we can discover lesions not recognizable by ordinary methods of examination, and the systematic use of the rays has confirmed the suspicion that fractures not infre-

quently exist with but slight symptoms, especially in children. It is now, in view of the advancement in this diagnostic measure, within the power of every physician, especially in the country, to be his own consultant and frequently correct his own mistakes, which would not and could not otherwise be recognized until too late. This being possible, it gives us also a correct record of our procedure during the whole of the treatment, if we wish it, and may protect us in every case.

There has been much written about the distortion, as a defect of this new method of diagnosis, but how about the microscope, ophthalmoscope, or any other delicate instrument? You have to look until you see something; and in fact, to the unpracticed eye, the microscope or ophthalmoscope is much more liable to lead one astray than the very simple application of the x-ray. To practice medicine, we had to study; to manage an individual case of typhoid, we have to read; to operate in a difficult case, we have to look up our authorities; and to manage the new means of diagnosis, the x-ray, we have to study just as well.

It is very simple, indeed, to get hold of the handle or switch and produce the rays with the help of the coil or the static machine, but it is really very difficult to manage the same and to know what to do in some cases, when the fundamental laws and principles of the technique are not understood. And let us state right here, that such nonchalance was the main cause of misrepresentations and many mistakes in the beginning of the x-ray phenomena, attributed falsely to the x-ray instead of to the operator himself.

The bone relationships in joints, the various joint movements, dislocations in what direction, fissures, true and "green-stick" fractures, depressions, separation of a splinter or apophysis; the direction and character of the line of the complete fracture, whether transverse, oblique, longitudinal, V or T shaped, or comminuted; the seat of the fracture, as to the neck, head, shaft, separation of the epiphysis, or if extended into a joint; multiple, compound or gunshot fractures; fractures of nasal septa, in the cavities of the head, near the sutures or grooves; can all be studied in a striking way with the help of the x-ray, and the different steps in bone development or repair observed. In regard to the callus formation, perfect or cartilaginous, union or non-union, caries, deposition of earthy salts in the joints or along the bones, the opening of the nutrient artery, centres of ossification, deformity, and functional ability, the x-ray tells us the truth and will teach us to do more honest and successful surgery. When the proper conditions and positions are known, the ray cannot mislead, its revelations are correct and infallible.

If fracture exists, whether it is simple, compound, or complicated with fissuration or depression, it is determined with the fluoroscope in five to ten seconds, or a skiagraph may be taken, without any aggravation of pain or any danger of complication to the patient. The skiagraph may be taken thru the first dressing, if necessary. In impacted fractures the diagnosis is impossible in any other way without great damage. The ray may also point out when reduction and coaptation can be effected, or when operation is necessary.

But the main thing! With the help of the x-ray we can make a correct diagnosis through the preliminary dressing, take the same off when the diagnosis is made and reduce the dislocation, apply proper dressing and observe with the fluoroscope in hand and under the ray during the whole procedure, our work until complete. In a case of fracture, we put the fragments together and apply the splints more accurately to each individual case, and thru them carefully observe the result of our work. We may change the positions of the fragments, if necessary,

and in time, and apply our final dressing when the fragments are fixed. The dressing need not be changed until absolutely necessary, and we may further observe thru the dressing the growths of the callus, whether the union of the bones is taking place or not, or photograph thru a plaster of Paris case, after an attempt at reduction, and see if proper approximation of the fragments has been accomplished, and find sometimes, perhaps, that the union did not and could not take place. This, under no circumstances, could be made out by other means of diagnosis. Or, if we have a case of suspected fracture or dislocation or both, where the swelling will not allow any digital examination on account of the pain or the inflammation which masks the true condition, the simple application of the ray at once reveals the status, without any discomfort to the patient and with great satisfaction to the surgeon. The greatest diagnostic difficulties are offered by the joints and by old fractures. The older it is, the less conspicuous the line of the fracture will appear, being overshadowed by the callus, according to the type of fracture. Sometimes we may have a refracture, especially important in medico-legal cases, and there we have to compare and study carefully the shadows of the first and the secondary callus.

In railroad cases we may see every particle of the crushed bone through the preliminary dressing and determine whether amputation is necessary, and how much can be saved. Skiagraphs in such cases, taken as soon as possible after the accident, again after first dressing and again when the patient is discharged from the care of the surgeon, leave the record complete. A skiagraph of the stump may sometimes be very interesting and useful. Such a method of correct diagnosis, and the whole procedure in each individual case, would be the only just solution of a contention between employer and employed. All this is done without general anesthesia. How often is the operation really of secondary importance as compared with the dangers of anesthesia in similar cases? With the facts before each party to the case, clear and unmistakable to both, is it not reasonable to think that litigation would diminish and enmity vanish?

In military surgery the x-ray enables us to work without the dreadful probe to observe the effects of the bullets on the different bones of the body, and will positively diagnosticate the existence or absence of a fracture, and when in close proximity to joints, it will show us not only the cause—the bullet—but whether or not the fracture extends into the joint, whether the fragments are displaced, or what other destruction of the bones has taken place. In such cases skiagraphy is evidently little more than an adjunct to other methods of examination, but if we choose we may try our sense of touch and determine the condition of affairs in the old way, or be protected and be sure by means of the new way. For any unavoidable repetition which may occur in the following descriptions I beg the reader's consideration.

In respect to photographic work, it is sufficient to say that the technique in fractures and dislocations is about the same as in other lesions. Care is to be taken again and again that the object sought be as near as possible to the plate. The sensitive plate after exposure is called a "negative," because all the dense portions of the subject are shown as being transparent on the glass, and the transparent portions of the subject are shown as being dense on the plate. These relations are rectified, however, in the print, which in place of being a negative has become a positive view. There is one thing to be remembered in skiagraphy—especially in medico-legal cases, which have to be explained to the jury or the court—

and that is that if the right hand is exposed to the ray, it will appear as a right hand on the negative, but when printed will have its position reversed, so that it looks life a left hand. (Morton.) This is certainly a very important point, and has to be constantly in mind in skiagraphing fractures, injuries to the bones, dislocations, etc., and especially in railroad cases.

If we have to examine the hand, the fluoroscope examination may be sufficient for correct diagnosis, especially if we compare the injured hand with the normal one, and finally examine the different bones in an articulated skeleton. If a skiagraph is needed, it is better to remove the dressings, if possible. If not possible, expose a little longer, examining the injured hand by moving in all directions before the plate is brought in. The same is true of the wrist and forearm, which are skiagraphed better if the hand or arm are in position of pronation directly over the plate. If the patient sweats easy, protect the envelopes with one layer of paper, or blotting paper, or as suggested in previous lessons. If the patient rests with the elbow on the table, splints are removed and the skiagraph is made in a few seconds. If the splints can not be removed, or if there is great swelling, the exposure has to last a little longer without intensifying screens. With a screen we have to be on guard not to overilluminate, and have the parts in proper position. If necessary, we have to use a fluorometer. Skiagraph both wrists, and take the lateral view, in pronation and supination, to get any deviation from the normal for a proper medico-legal record. In young patients, the epiphyses and their divisions must be observed carefully, remembering that a line of fracture is not smooth, as in the separation of epiphyses. Fractures of the radius and ulna are diagnosed very easily, but Colles' fracture, fracture of a sesamoid bone, fractures of phalanges, especially fissure fractures, and incomplete fractures generally, are the most frequent, and are altogether different from what books on surgery used to tell us. The treatment differs also, according to each indiviual case, splints being adapted exactly to the lesion found. In examining the elbow, move the joint, and observe laterally first. If the humerus is involved extend the arm. In making the picture put the elbow on the plate in lateral position or antero-posterior position, according to the results of the fluoroscopic examination which was made first and gave us a clew how to bring the lesion as near as possible to the plate. Fractures of the olecranon are made out very easily. The intra-articular space is more transparent, and the diagnosis of ankylosis, whether bony or false, is made possible. In children we should not be confused by the epiphyses or the head of the ulna, which on account of its peculiar shape and anatomical construction may seem to be fractured. Skiagraphs of any dislocations at the elbow are made readily, and are reliable records of status presens. Fractures of the humerus or dislocations of the shoulder joint have to be observed fluoroscopically first, posteriorly and anteriorly. It is always better to skiagraph in such a case, putting the patient on his back, and the plate under the shoulder. In all such cases, if necessary, the parts skiagraphed have to be immobilized, as suggested before, and the hand examined put in pronation over the abdomen. Fractures of the clavicle and of the ribs are seen with the fluoroscope very nicely, but fractures or injuries to the scapula and cervical vertebræ are better skiagraphed from two positions at least, laterally and antero-posteriorly. Injuries to maxillary bones and bones of the skull are better studied in a skiagraph made with the help of the intensifying screen. Results are not always good, and we may have to make several exposures to get a good picture. Fractures of nasal bones are recognized

easily with the fluoroscope. Examinations of the lower extremities are practically the same as those of the upper extremities. If we get a good negative, it is well sometimes to enlarge the same, and reproduce all the details found in a marked contrast with a simple shadow picture. to make a good skiagraph of the foot it is absolutely necessary to make our fluoroscopic examinations first and compare the injured part with the normal one. We ask the patient to step on our plate carefully if metatarsus and phalanges are photographed; if tarsal bones are injured or diseased the plate is put against the dorsal part of the foot, which must be elevated, and a second picture is taken with the plate under the foot. In examining the ankle rotate the foot and observe carefully, find the injury, and place your patient on his back in making a skiagraph. Immobilize the foot properly. The tibia and fibula, when skiagraphed, must not overlap each other, and be distinct, the marrow cavity showing plainly. In injuries of the knee joint or of the femur make always two pictures, placing the plate either on the inner or the outer side for the second. The hip-joint is hard to take for beginners, and the pelvis is also. In such cases we take always two plates for verification, intensify the negative, or proceed according to the directions given in previous lessons with a lead-box or lead support under the plate, and the screens. Read the negative properly, observing the white lines of the ridges near the great trochanter, and dark lines which may indicate extra or intracapsular fractures or diseased portions of the bony siructures. In these cases or in skiagraphy of the pelvis it is well to use large plates, and the patient should be told to evacuate the bladder and the rectum before exposure. For lumbar and dorsal injuries use separate plates or flexible films, if possible.

Report of Cases of Cancers Treated by X-Rays.*

By J. D. Gibson, M. D., Birmingham, Ala.

I bring before you for discussion today a report on some cases of the various forms of cancer that I have treated by means of the x-ray.

As it is comparatively a new field I think it requires a most thoro investigation of all of the development in order that we may the better help the sorely afflicted with this terrible disease.

Case I.—D. D. B., of Memphis, Tenn., white, age forty-six; occupation, insurance adjuster. A case of melanosarcoma. He first sought medical advice in May, 1901, for ulcer on the left side of the mouth, supposed to be caused by an old tooth, and was informed of the suspicious character of the ulcer. He was operated upon on the first day of September 1901, by prominent surgeons of his city, and the growth removed. The wound healed kindly and all seemed well, until January, 1902, when the pains became very violent in the jaw and neck and the growth began to reappear.

In the following February another operation for its removal was made by the same gentlemen, and in ten days it was back and almost as large as ever. April 1 he went to Chicago where it was treated by paste applications for two weeks, and was then told to return home and poultice it for sixteen days, and then return to Chicago. He did so, and was promptly informed that he was beyond the reach of aid by this means, and he had better return home and make his preparations for death. All the hospitals of Chicago refused him any hope and so he returned home, only to meet the comforting assurance from his physicians that death

*Read at the annual meeting of the American Electro-Therapeutic Association. From the official organ.

was unavoidable and he should prepare for it at once.

He came under my care on the 16th day of May, 1902. He presented a wretched condition. Several hypodermic injections of morphine had been given him en route to my place to enable him to withstand the strain of the journey. He was very much emaciated and weak and had considerable fever and no appetite. He presented a large bulging mass on the left side of the neck, head, and face, pushing up the lower lobe of left ear extending in front and behind ear and down on the side of the neck and lower jaw, standing out to one-half of the distance from the neck to the breadth of left shoulder. The summit of the tumor was broken down and ulcerating and measured 4 by 4 1-2 inches in the two diameters from which fungous melanotic tissue arose in a ring around the margins and in the center. There were crevices between these fungous masses through which a probe could be introduced without pain or inconvenience for two inches.

My diagnosis was a melano-sarcoma, and I found it had been so declared twice after microscopic examinations.

I commenced treating him daily with a medium tube placed at a distance of from four to six inches, excited by a twelve-plate static machine of which the plates were thirty-three inches in diameter, and giving ten minutes' exposure. The improvement was all that could be expected; the melanotic mass crumbled and fell off in great chunks; in fact, it disappeared so rapidly that I feared that it would be burned, and began to make five-minute exposures until after July 6, when I found to my consternation that the growth was beginning to return, and instead of the roots continuing to disappear, I saw them beginning to grow rapidly. I then changed to a tube of higher vacuum, and made the exposures at a distance of from three to four inches for periods of fifteen minutes, and I soon brought the growth to a standstill. Retrogression set in the same as before, and I gave him forty-four daily treatments without intermission, when the opening measured but 3-4 by 1 1-4 inches in diameter.

Owing to humidity I have been using for the past month the Kinraide coil and my patient was badly burned. I am now giving him all the treatment I can without burning too severely.

This patient I consider almost well or on a very safe footing, as far as the original cancer is concerned; but as far as metastasis is concerned there is a great deal to fear. To the present time his life has been prolonged, and we have every assurance now that he will live for some time to come and may recover.

The reactions were very severe in his case. The fever ran high and at one time the collapse was dangerous, accompanied with excessive diarrhea and marked sepsis, which was relieved by making many openings for drainage around the tumor and lower part of neck and jaw.

Case II.—Mrs. S., age thirty-six years, white, Jewess married, six children, youngest two years old. I saw her first April 19, 1902, when she seemed well nourished and was very hopeful. She first noticed some trouble with her rectum in September, 1901. In October it was pronounced to be cancer by one of the most prominent surgeons of this city, and was operated upon by removing the rectum and recto-vaginal septum for several inches. I found on examination the vagina and old rectal space filled with carcinomatous masses. The operation field was one solid carcinomatous mass, and new masses shaped like small potatoes were in the fornix of the vagina and pelvis. The vagina was opened by a bivalve speculum, and the ray turned on after protecting the surrounding parts with sheet lead. For a while the masses disappeared rapidly and the conquest seemed easy, but the

cancers would come behind the speculum, while in front they would recede. The old rectal space was sore and painful, but the edges and wall were much softer, but were smeared with the feces which were constantly passing from the bowels.

I have great trouble to adjust any protection to keep from burning her, and have given her severe dermatitis at two different times.

To obviate the difficulty of the steel speculum protecting the cancer behind it from the rays, I have substituted a temporary affair of wood which is composed of two thin strips, and by means of which the vaginal wall is held open; the rays, penetrating the wood, reach and affect the cancer. By this means we are able to check the small cancers and hope to finally effect a cure.

This case is a troublesome one, and though I hope to cure the carcinoma, the rectum and field of operation will always remain a great source of annoyance.

The original carcinomas are being checked, and by employment of the wooden speculum, the small ones in the vaginal walls are also under control. The reaction in this case never was very violent. The exposure so relieves the pain that the patient is always ready for her treatment.

Case III.—Mrs. D., age forty-six. Inoperable epithelioma of uterus; was first seen May 18, 1902. She was emaciated, cachectic, and very weak. The cervix was entirely destroyed and the epithelioma was far advanced into the body of the uterus, the parametrium being considerably involved. She was referred to me by a prominent surgeon of Birmingham, he feeling that the only possible hope for her lay in the x-ray treatment. Her life has been prolonged, hemorrhage lessened, and at one time I had strong hopes of curing her; but from unpleasant domestic troubles with which she had to contend, coming out of it in most abject poverty, she was compelled to leave the city and return to her mother in an adjoining state, where death has been or will be unavoidable before long.

If this woman could have been kept and well cared for the result might, and I believe would, have been different, but without treatment she will die.

Case IV.—Mr. D. W., occupation, editor; age, sixty-nine years; diagnosis, epithelioma over right temple, standing out about one-half inch above the skin and covered with darkish yellow secretion and detritus from previous treatment with Byers oil, etc.

The cancer measured one-half an inch by two inches in diameter. X-ray was commenced May 12, 1902. The tube was placed at from eight to ten inches from the surface of the cancer and exposed for about ten minutes. Considerable reaction was present during several weeks of treatment. The cancer, as it were, melted down and disappeared, and it seemed for a time as if the excavation would go to the bone. Finally, however, it began to fill in with healthy granulation, and the patient returned home with rapid cicatrization in progress, August 8, 1902. On August 28 he returned for examination, when the healing was almost complete. He was dismissed from further treatment. I consider him to be cured.

Case V.—Mr. B., age sixty-six years; diagnosis, recurrent epithelioma in the old cicatrices of the left alæ of the nose and another growth about the size of a hazelnut under the left eye over the malar process.

The original epithelioma had been removed three times by paste or caustics and had returned. He was exposed to the x-rays June 1, 1902; a slight primary reaction followed. The growth broke down and in a short time healed over very smoothly. He discontinued treatment July 1, declaring himself well, and he is to all

appearances now cured, there having been no recurrence up to the present time.

Case VI.—S. B., colored, age thirty-four years, stout and healthy, came to me March 1. On the external surface of the right forearm there was a very suspicious ulcer of long duration, which gave her great pain. I sent her to a microscopist, who could not give a positive diagnosis of epithelioma but thought it was one. I gave her five treatments, one or two per week, using a low vacuum tube, exposure five minutes, distance six inches. The reaction was severe after each sèance; and being an ignorant colored woman, she would stand the cancer instead of submitting to the chills and malaise of the reaction. The ulcer, when last seen, was about one-third of its original size. In fact, I have seen no other cancer that has responded so promptly to treatment as this ulcer, nor none which gave so pronounced a chill in the reaction.

There are three other cases which I could add to this report, but it would be simply a repetition. They have not been under treatment long enough to show decided benefit, but all are doing as well as could be wished.

I am most positively convinced that many forms of malignant growth can be cured by patience and a proper exposure to the x-ray.

All x-rays are not capable of doing the same work any more than the winter or Arctic sun will furnish the heat necessary in the tropics. The sun is the same, but the effects of its radiation under varied conditions are quite different, and so with the rays; the individual peculiarity of different patients is an important factor, to say nothing of the different kinds of tumors, and their location and accessibility.

I believe, in the cure of any ordinary malignant growth or cancer, only two things are necessary for their cure, and they are the regulated quality and quantity of the x-ray, employing proper protection of the adjacent tissues.

The superficial cancer requires very different rays from the more remote uterine cancer; in fact, x-rays, from the softest to the hardest tubes, should be used as the individual case requires.

For instance, in treating an epithelioma of the temporal or parietal region of the cranium, it will be found that very powerful x-rays from a hard tube, administered daily, would bring on such mental symptoms and discomfort as to cause you to desist, as it might produce permanent injury to the brain; while in a uterine or other internal cancer it would be the character of the x-ray preferred.

In conclusion I will repeat that I consider the Röntgen ray, when the proper penetrating radiance is employed at the correct distance, and proper frequency and length of exposure, to be almost absolutely a specific for any malignant growth.

DISCUSSION.

Dr. Robinson of Lexington, Ky., thought there was only one way to use the x-ray, i. e., with a high-vacuum tube. A very common error was to use the x-ray too often. He believed treatments given twice a week were generally sufficient. A tube should be used in all cases which will thoroly penetrate the diseased tissue.

Dr. W. B. Snow said that in the case of carcinoma described in the paper the disease returned very rapidly on stopping the x-ray treatment. Since last April he had been treating a case of osteosarcoma of the superior maxilla which had been operated upon by Dr. W. T. Bull. The case was of unusual interest, as showing the persistency and extension of the sarcomatous growth, in spite of vigorous treatment. The original growth having been removed the disease immediately asserted itself elsewhere. The point receiving the most direct treatment would yield, and almost immediately an adjacent por-

tion would become involved. He referred to this because it demonstrated that there was something more than a purely local trouble—in other words, there must be an element back of the local manifestation. He felt that in spite of the treatment metastasis was always apt to appear in some distant part.

Dr. C. E. Skinner said that the point made by Dr. Gibson, that rays of different penetrating power were necessary for tumors in different parts of the body, was of extreme importance. There were many superficial growths in which tubes of different vacuums would have to be used at different times. For instance, a growth would respond well for three or four weeks to a low vacuum, and then there would be no more progress until a high-vacuum tube was used. Another interesting fact brought out in the paper was that mental symptoms might sometimes be produced when using the rays about the head. He had never seen this himself altho he had used the most powerful rays about the head. In connection with treatment of the head it had been asserted that cancer situated in close proximity to bony tissue, and where there was little adipose tissue, as about the vertex of the skull and maxillary prominences, did not respond so well as parts in which there was much adipose tissue, as, for example, in the mammary region. This had not been his own experience, but he would like to hear from others on this point.

Dr. H. Preston Pratt of Chicago said he had been deeply interested in the x-ray, and had been continuously studying it since 1896. He had studied the effects upon different patients, and had given nearly thirty thousand treatments. When beginning this work it had been his intention to systematically study the subject. In the experiments by Professor Röntgen and those by Phillip Lenard the effort was to discover whether or not the cathode stream passed outside of the tube, believing that the x-ray was the old cathode ray. Let us imagine an electrode being placed on one part of the body and another on the opposite side. Allow a current to pass. The result would be ionic changes. The human body is composed of fifteen elements, and these are associated with one another. They are held together by electrical force. When a current was applied to the body the same effect was produced as resulted from the action of one magnet upon another—in other words, metabolism was increased. A simple explanation of the x-ray action was to be found by supposing that it was similar to the action of the ordinary electric current. On the side of the body exposed to the x-ray one obtained an acid, and on the opposite side an alkali. In the x-ray thousands of lines of force are concentrated and the greater the concentration the greater the decomposition and the greater the change in the tissues. By following out this reasoning we could understand what the x-ray had done and was doing. In his own work he was using a low tube on superficial cancer, a tube which would show only the outlines of the bones of the hands. By increasing the force of the machine he was able to penetrate the body. The object was to produce the greatest number of lines of force in the smallest space.

Dr. G. Betton Massey said that this discovery of an acid reaction on the near side and of an alkaline reaction on the opposite side, if confirmed by others, was of great importance, and a more detailed description of it should be given. A certain physicist had said that the action of the x-ray on the human body seemed to him akin to the response given by a sounding board to a given note. Wave action, set up by the x-ray, intensified vital processes, quickened physiological resistance, and hastened the death of low organized tissue. This seemed to be sim-

ilar to the theory briefly described by the last speaker.

Dr. Pratt said that he would go into this subject more fully at a meeting of the Röntgen Society to be held next December. There was absolute proof that the action of the x-ray on the body was due to changes in the ions produced by electrical force.

Dr. Robinson asked how the body could be penetrated by a low tube.

Dr. Pratt replied that it could not be done successfully with the static machine. He made use of low-vacuum tubes and arranged the coil so that he was using at a minimum 1 to 1.5 amperes. By taking out resistance he could, therefore, crowd the current. All the physicians in Chicago who had had much experience with x-ray work were now using low-vacuum tubes because experience had taught them the necessity for this. At first they had used the high tubes, but had not considered that there were streamers from these tubes which produced disappointing results. At first, he had himself used the high-vacuum tube, but he now obtained far better results from the low-vacuum tube; but this tube must be crowded. The static breeze should not be used on the cancer cases. Why? If the finger were infected, for example, would one squeeze it and spread the infection? No. Then, why use the static breeze?

Dr. William Stevens asked how a physician, in general practice, could be taught to make a correct diagnosis of the cases of malignant disease which should be sent for electrical treatment.

Dr. A. C. Geyser said that he wished to challenge the statement made by Dr. Pratt. Two years ago he had brought out the fact that the static breeze should be used only where there was an exposed surface. At that time he had cited cases, and had since exhibited them at a medical society meeting, showing that this was the only and proper method. The cases had absolutely refused to heal until the spray had been used. Dr. Snow and others in the school would bear out this statement.

Dr. Gibson closed the discussion. He said that he did not believe any two cases could be treated exactly alike by the x-ray. He believed he had saved his cases from metastasis by the treatment. He believed in skin cancers the soft ray would frequently do the most good. When the ray would penetrate the body well he called such a ray at least one of medium hardness. As soon as a physician met with an ulcer or other suspicious condition which would not readily heal he should have a microscopical examination made, and if the diagnosis pointed to malignancy the x-ray treatment should be resorted to.

The Chicago Electro-Medical Society.

The annual and the 16th regular meeting of the Chicago Electro-Medical Society was held in room 912 Masonic Temple, Wednesday evening, November 26th, 1902. The first vice-president, Dr. Pettyjohn, in the chair. The minutes of the last meeting were read and approved.

John P. Webster, M. D., O. McMichael, M. D., and others, were elected to membership.

The secretary reported that the membership one year ago was: Regular members, 11; associates, 6. In September last, when an attempt was made to disband the society, the membership was: Regulars, 27; associates, 11. The membership now is: Regulars, 51; associates, 16.

The election of officers and committees resulted as follows:

President, Elmore S. Pettyjohn, M. D.
1st vice-pres., W. K. Harrison, M. D.
2nd vice-pres., John E. Gilman, M. D.
3rd vice-pres., E. G. Trowbridge, M. D.
Secretary, T. Proctor Hall, M. D.
Treasurer, Wm. E. Holland, M. D.
Executive Committee: H. Preston

Pratt, M. D., R. H. Bartlett, M. D., John P. Webster, M. D.

Membership Committee: J. L. Hammond, M. D., P. S. Replogle, M. D., Hamilton B. Forline, M. D.

Publication Committee: H. Preston Pratt, M. D., A. W. Smith, M. D., J. E. Harper, M. D.

Judiciary Committee: L. D. Rogers, M. D., Frank Duncan, M. D., W. A. Pratt, M. D.

Dr. H. P. Pratt gave notice of an amendment to the constitution providing for assistants to the secretary and treasurer, and for an addition to the standing committees.

On motion the following resolution was adopted:

WHERAS, The report of the Committee on Scientific Research, which was unanimously adopted by this society March 25, 1902, showed that Dr. H. Preston Pratt, a member of this society, was the first to make use of the x-rays for therapeutic purposes; and

WHEREAS, Claims of priority in this work have been made and are still being made by various other persons; therefore the Committee on Scientific Research is requested to extend and complete its historical investigations regarding the therapeutic use of the x-ray during the years 1896 and 1897.

The next meeting will be held Monday evening, December 29, at 8 o'clock, in room 912 Masonic Temple. Papers will be presented by W. K. Harrison, M. D., and Byron Robinson, M. D.

The president elect, Dr. Pettyjohn, read a paper on Electro-Therapeutical Practice, which follows.

T. P. HALL, M. D.
Secretary.

Notes on Electro-Therapeutics.

ELMORE S. PETTYJOHN, M. D.
Professor Principles and Practice of Medicine, Harvey Medical College; Dean and Professor Practice and Nervous Diseases Chicago College of X-Ray and Electro-Therapeutics; Member American Roentgen-Ray Society, etc., etc.

The practice of electro-therapeutics is too general among the best physicians to need any encomium. Electro-therapy is one of the approved remedial agencies used with great success and scientifically in practice and in sanitariums thruout Europe and America. We need only to be reminded of its efficiency and I give but briefly, results of the treatment by electro-therapy in a few of the many ailments to which this treatment is applicable.

These I have noted in my own practice for the past 15 years.

ELECTRO-DIAGNOSIS.

In 1839 Marshall Hall called attention of the profession to the value of electricity in the differential diagnosis of paralysis. The necessity of familiarity with normal electrical reactions of the different tissues and organs of the body is obvious. As there is no definite standard of electro-sensibility we must depend on principles and the individual patient, rather than rules and generalizations. Increased sensitiveness of any tissue (or its diminution) indicates abnormal condition, to be determined by other means combined with the electrical phenomena. Our first study is that of Electro-Anatomy.

It is only by practice and continued observation that we are able to determine how much electricity enters the muscular tissue and traverses the nerve substance. We must also distinguish between simple cutaneous hyperesthesia and the irritability of the underlying muscle. The conductivity, resistance and absorptive power of the skin and muscles below, depend on the density, the amount of liquid contained therein, and the temperature of the part treated; the temperature, moisture, size and composition of the electrode used;

the strength, continuance and frequency of the current used, whatever form is employed.

To influence the deep structures, especially in the presence of congestion or inflammation, the current should be diluted by using a large surface applicator of the proper substance (spongiopiline in continuous current), and a mild current more frequently repeated, rather than a strong current, under most conditions.

We are to be guided by the principle of hastening metabolism (that constant succession of elimination and repair occuring in the cells of the tissues), the susceptibility of the individual, and the personal equation, born of experience.

We should all be familiar with the principles of muscular action and reaction, and the various contractions in a normal condition under the influence of the electrical current designated by C.C.C., A.C.C., A.O.C., C.O.C., else how may we determine the reaction of degeneration or the absence of action by degeneration?

GOITRE.

In treatment of simple enlargement, (recent or long continued) of the thyroid gland I have been successful in the use of galvanism, using the anode with small electrode over the gland, with a large kathode well moistened on which the patient places both hands, using 8 to 15 ma., once or twice a week. In cases of longer duration (apparently recurrent) I use ung. hydrarg. biniodid, by placing abundance under an antiseptic electrode covered with protective conductor, using anode over the gland and kathode as above, the same amperage, making the application every six days. Care should be taken not to use a strong current, nor for over two minutes on the same surface. The epithelium will be darkened and reddened and probably exfoliate, but the constitutional effect and diminution of the glandular enlargement will be positive. In these cases as in others, aside from the electrolytic action in the electrode itself, which, of course, should be nonoxidizable (the which I do not attempt to formulate), there is undoubted transfer of a portion of the medicament, the mercuric ions which move toward the kathode, into the tissues of the gland. The amount of mercury carried into the gland is directly proportional to the strength of the current, which, again, is subject to Ohm's law,

$$\text{Current} = \frac{\text{E. M. F.}}{\text{Resistance.}}$$

Superficial neuralgia is relieved with 4 per cent solution cocaine placed on the surface of the positive electrode, usually covered with absorbent cotton, being careful of the amount used. The obvious difficulty in administering narcotics and sedatives is in measuring accurately the quantity administered. This may be done with proper apparatus.

MERCURY.

I have induced successful absorption of ung. hydrarg. under a large electrode placed over ung. after rubbing, in a larger quantity than would be absorbed without the current. This is a decidedly preferable method to the use of mercury in the bath, particularly on account of the debilitating effect of the warm bath when used even every other day.

In the treatment of various and varied muscular atrophies and paralyses which is a large and fruitful field of electrical application, all electrical treatment (and so with any other) to be successful and rational must consider the etiology, diagnosis, pathology and classification primarily. We are then only ready to select the appropriate form of application of electricity or the x-ray in accordance with the pathological condition in which we find the organ, or diseased tissue.

Treatment of the infantile paralyses has been naturally most successful. Atrophy not always being strictly a paralysis is most amenable to treatment. Spinal

curvatures are often the result of unequal atrophy of the muscles of the trunk; the deltoids and the trapezii.

I permit less than a week to elapse after the acute condition begins in the cord (poliomyelitis anterior) to avoid further irritation of inflamed areas. Electrical treatment will then arouse the ganglionic cells. The kathode is placed in water under the feet (at body temperature) the anode moved gently along the spine and alternately traversing the affected limb. Ten to twelve ma. are used at each treatment for from 6 to 10 minutes daily or on alternate days. An interrupted galvanic current is used to stimulate muscular contraction and gentle massage is then given daily to hasten metabolism in the affected parts.

EPILEPSY.

In epilepsy I use electricity because I believe it has a special influence on the nerve centers of the brain and on the cerebral circulation, and also because of its constitutional effects in hastening elimination and repair which are the essential processes of good health in the brain as elsewhere. There is apparently a similar sedative effect in the administration of bromides and the use of central galvanism and general faradization. If, as we believe, idiopathic epilepsy is caused by excitability of the cerebro-spinal centers, central galvanization, which often puts a patient asleep in a few minutes, should have a sedative effect on an epileptic—and it does. My preference is central galvanization alternated with carefully applied cephalic galvanization, always using weak currents, not over 3 ma., the duration one minute, repeated alternate days. A large anode is placed on the forehead with kathode to the base of the cerebrum, the hair being thoroly wetted. Two or three treatments may be given 10 minutes apart, at the one sitting. Time forbids the report of cases to substantiate the results.

In conjunction with this treatment every tonic and hygienic measure is used. Suffice it to say that I have had cures in cases where only the bromides had been used, the patient being in the hands of eminent specialists six years, with no improvement. I have such cases now under my care that are improving.

92 STATE ST.

City of Chicago.
John E. Owens, City Attorney.

CHICAGO, Dec. 16, 1902.

Dr. H. Preston Pratt,
Masonic Temple, City.

DEAR DOCTOR:

I have the honor to tender you the appointment of X-ray Expert and Electrical Diagnostician of the Legal Department of the City of Chicago. This office has become necessary on account of numerous attempts at fraud through the evidence of x-ray and electrical so-called experts in claims against the city for personal injuries.

As a pioneer in x-ray therapy and as an electro-therapeutist of well known ability and long experience, I know the Law Department of the city will be immeasurably the gainer by your acceptance, which, I hope, you will transmit to me without delay.

Yours truly,
JOHN E. OWENS,
City Attorney.

The following prominent members of the American Electro-Therapeutic Association were present at the Chicago meeting of the American Roentgen Ray Society:

Clarence E. Skinner, M. D., LL. D., the popular secretary, New Haven, Conn.; J. D. Gibson, M. D., Birmingham, Ala.; Harvey H. Roberts, M. D., Lexington, Ky.; Willis P. Spring, M. D., Minneapolis; Professor W. E. Goldsborough, Chief of the Department of Electricity, World's Fair, St. Louis.

American Roentgen Ray Society.

Third Annual Meeting held in Chicago, December 10-11 1902, under the presidency of Dr. G. P. Girdwood, of Montreal, Canada.

The first paper on the program was read by Dr. T. Proctor Hall, Chicago,

X-RAY PHYSICS.

The author considered the physics of the x-ray, discussing the subject from the purely scientific standpoint. In conclusion he exhibited a new fluoroscope designed by Dr. H. Preston Pratt, of Chicago, which in his estimation is a very superior instrument. He believes that the x-rays are electrical waves of some sort, and are the result of some electrical disturbance.

This paper was discussed by Drs. Clarence E. Skinner and L. E. Custer, and Major W. C. Borden.

EQUAL POTENTIAL SURFACES IN X-RAY FIELD.

Dr. John C. Pitkin, of Buffalo, N. Y., contributed this paper. He considered the principles and mechanics of the static machine and exhibited an apparatus of his invention, which illustrated that many small air gaps in a simple series are superior in action to one long interval. This apparatus consists of a solid glass rod about twelve inches long and one-half inch in diameter, on which are slipped a number of plain brass band rings, which are freely movable so as to form intervening air gaps. He finds that this apparatus greatly intensifies the x-ray. In order to avoid distortion of the x-ray image, the fluoroscopic screen and the photographic surface should be made to conform to the shape of these equi-potential surfaces.

Discussed by Drs. T. P. Hall, H. E. Waite and J. Rudis-Jicinsky.

PRESIDENTIAL ADDRESS.

Dr. Girdwood reviewed the origin of electricity and the various terms used in this science. The gradual development from the time of the early Greeks up to the present day and the discovery of the Roentgen ray, were fully considered. The skiagraph, the fluoroscope and all the modern electrical appliances used either for purposes of diagnosis or therapeusis were described in detail. In this connection the author called the attention of the society to the fact that it has always been customary in electrical circles when any new discovery is made to honor the discoverer by giving his name to the finding. For this reason we should always refer to the x-ray as the Roentgen ray. The nature of the rays was also discussed and the author exhibited a number of skiagraphs made by him when the work in this line was still in its infancy.

SYSTEMATIC RECORDS; THE ROUTINE USE OF THE X-RAYS.

Mr. W. J. Wilbert, of Philadelphia, Pa., described the method of keeping records of x-ray work which is in vogue in the hospital of which he is the radiographer. The former system of keeping the records on cards has been abandoned for the book record, which is more convenient and also more practical. The records cannot be lost and by means of letters, numerals, and various signs, the records can be kept very fully and be intelligible only to the hospital authorities. The book is fully indexed, with profuse cross references.

He also called attention to the advantages which accrue from the routine use of the x-ray in all cases that present themselves for treatment, especially in the hospital. Cases of fracture, especially when of the inter-articular variety, are often mistaken for a simple case of sprain or luxation. Even a beginning tubercu-

lar hip joint disease may be wrongly diagnosed. But when it is made a rule to use the x-ray in every case these errors are not liable to occur. He exhibited a number of skiagraphs and gave histories of the cases illustrating this point. The x-ray should not be used only in law or for show cases.

Discussed by Drs. Scott, Girdwood, and Major Wm. C. Borden, U. S. A., of the General Hospital at Washington, who related several cases of enlisted men who had received an injury of the knee and in which a diagnosis of fracture was not made until some time afterward when he used the x-ray. He believes that every case of injury to a joint should be rayed, no matter whether it be one of fracture, supposed sprain, or dislocation, as these are oftentimes mistaken one for the other, and only by using the x-ray will it be possible to know what treatment it is proper to give.

SKIAGRAPHY AS AN ART.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., contributed this paper. He advised among other things that no greater part of the body be illuminated than is absolutely necessary, and the rays should be concentrated at the point to be exposed. Nor should the parts be over-illuminated. Both over and under-exposure must be avoided. In the preparation of a good skiagram great skill and judgment are necessary, for the expert is often able to find things which are entirely unintelligible or invisible to the novice. The correct reading of the shadows of a skiagram is by no means an easy task. In closing he described his method for making skiagraphs and exhibited numerous negatives showing the results of his work.

RESULTS AND TECHNIQUE IN TREATING EPITHELIOMA WITH THE X-RAYS.

The author, Dr. Emil H. Grubbe, of Chicago, decried the indiscriminate use of the high and low tubes in the treatment of epithelioma with the x-ray. We should always use a tube with a vacuum just high enough to penetrate the tissues to be exposed. Inflammation of deep and surrounding tissues is to be avoided. Either the static machine or the induction coil may be used in this work. When the static machine is used it is advisable to use at least two series spark gaps between the machine and the tube. If the coil is used the connection may be made to the tube without the use of the spark gap in series. The principal thing is to maintain a constant vacuum in the tube. The controlling factors of this method are the quality of the tube, the distance of the tube from the parts to be treated, the time of exposure, the frequency of the exposure, and the exciting apparatus. The time of exposure depends on the x-ray intensity.

The treatments are given daily with exposures of ten minutes. The tube is placed from four to six inches from the affected part, and the ray is then applied until a reaction ensues in the shape of redness, heat and itching, when the treatments are discontinued for from two to seven days. When the treatment is resumed the patient is again exposed in the same manner to the same rays. The parts not to be treated are protected by a thin mask of sheet lead. The occurrence of dermatitis does not retard the cure; in fact, a dermatitis is usually an indication that the treatment is beginning to be effective. Proper general or systematic treatment should be used in conjunction with the x-ray.

In about half the cases which came under the author's observation the disease was located upon the surface and was readily brot under the influence of the ray. A large number of cases are referred to and the results tabulated. In the majority of the cases his efforts were successful and of such a nature as could not have been obtained by any other

method of treatment. An absolute cure is not claimed, but only a symptomatic cure. In all cases of uncomplicated superficial epithelioma, in which the diagnosis was made early, the results have been such as to warrant the use of the word "cure" in its fullest sense. In inoperable cases the x-ray is as nearly a specific as any other therapeutic agent in use today. The results vary with the location of the disease.

Dr. Clarence E. Skinner, of New Haven, Conn., agrees with the author except as to the necessity of producing a dermatitis, altho in the majority of the cases the cure is hastened by the production of some dermatitis, but not in all.

Dr. Gibson, of Birmingham, Ala., said that in the East they avoid burning, whereas in the West they do not seem to care much whether they burn or not. Personally he favors neither burning nor the use of the intensified rays, as it is liable to produce too much detritus, which will retard the progress of the case, and perhaps even destroy life. The treatment ought, under no condition, to be pushed beyond a burn of the first degree.

Dr. J. C. Pitkin, of Buffalo, said that if we expose cases of cancer that have resisted the x-ray to the ultra-violet ray a speedy cure will result. Not in all cases but in a large proportion.

Dr. G. C. Burdick, of Chicago, called attention to the difference between a dermatitis and necrosis or sloughing. Some persons appear to possess an idiosyncrasy to the x-ray with the result that even after a very few exposures a decided dermatitis results. No application of any kind should be made to an x-ray burn. Expose it to the air and when vesication occurs apply benzoinated lard with a gauze protection. This promotes healing considerably. He does not believe it necessary to burn and tries to avoid it as much as possible.

Dr. E. J. Brown, of Decatur, Ill., believes in producing a dermatitis and finds that it is much easier to produce a burn on the body than on the face, and the former is also much more difficult to cure. He makes it a practice to give the treatment in relays, giving from six to eight treatments, or until he gets a dermatitis. He then waits for the reaction, after which the treatment is resumed. Surgery is much more destructive than the x-ray, both as to function and cosmetic effect. The ray destroys little tissue and does not interfere with function.

THE ROENTGEN RAY AS A THERAPEUTIC FORCE, FROM A CLINICAL STANDPOINT, WITH ILLUSTRATIVE CASES.

Dr. John B. Murphy, of Chicago, the author of this paper, said that in the fracture element in surgery the x-ray is of enormous benefit, altho it is by no means infallible. He exhibited two skiagrams and related several cases in support of this statement. In tuberculosis of the joints the x-ray enables us to learn just what class of cases are going to be benefited by injection and which are not. That is, whether the lesion is limited to the synovial membranes or to the bones, or whether it involves both. If the x-ray shows that the lesion is primarily synovial we inject and the patient recovers. It is also valuable for both its diagnostic and therapeutic effect in tuberculosis of the bones and joints. One case he cited, a tuberculosis of the knee joint, was cured in twenty-one days. He has also found it useful in tuberculosis of the spine. He cited three cases in which a granuloma had formed and a paraplegia resulted. One was cured after twenty-five applications of the ray, another after twenty-one, and another, still under treatment, is walking about free from pain after twenty-three applications.

So far as renal calculi are concerned, the x-ray is apt to be exceedingly misleading. An English hospital reports that

in about eight per cent of cases in which the ray showed a stone the operator was unable to find one; in some cases because the stone was not there, and in others because it could not be found. Accumulations in the alimentary canal sometimes give a shadow which may be mistaken for a stone. Care should be taken to get a good radiograph and an expert to interpret it before making any positive statements as to the absence or presence of a stone.

In regard to the therapeutic use of the ray in malignant disease, the author exhibited a slide taken from a case of carcinoma of the breast which was considered inoperable and was referred for treatment with the x-ray. The size of the tumor diminished rapidly, but after twenty-six applications the patient died from an intercurrent gastritis. The tumor was enormously reduced in size and the microscopic examination showed that there was an increase in the connective tissue elements and a decrease in the cellular elements, with a considerable vacuolation of their protoplasm. The carcinomatous glands were not in the least affected by the ray, including a gland at the periphery of the growth and which had received the full force of the ray. The therapeutic effect of the ray on intestinal and tubercular fistulas elsewhere should not be overlooked. The sinuses are closed up rapidly.

Dr. A. M. Phelps, of Battle Creek, Mich., related a case of carcinoma of the breast with extensive metastasis in all parts of the body. The case was considered inoperable and was treated by the x-rays as a last resort. The result was an excellent one so far as a disappearance of all the tumor masses went. They were considerably decreased in size, showing the decided effects that can be produced upon the deep seated structures by the x-ray.

Dr. Gordon G. Burdick, of Chicago, cited a number of cases of sarcoma and osteo-sarcoma which had yielded to the x-ray treatment. Altho the growths did not disappear entirely yet they shrunk considerably in size. All pain disappeared and the general condition of the patient is greatly improved. The growth remains stationary, which is very unusual for a sarcoma of any kind.

Dr. J. P. Marsh, of Troy, N. Y., related a case of melano sarcoma involving the left shoulder and side of the chest, with numerous metastases in the subcutaneous tissues, in which blood counts had been of some value from the side of prognosis. When the treatment was begun the leucocytes numbered 18,000. They gradually decreased in number after each treatment and the patient became correspondingly worse. He has observed that if the leucocyte count goes up the case will yield quickly, but if the count goes down the outcome is usually not a favorable one. He believes that x-ray workers should pay more attention to the blood count.

Dr. Clarence E. Skinner, of New Haven, Conn., is of the opinion that different cases of sarcoma respond differently to the x-ray. He mentioned one case of very extensive sarcoma of the neck which had existed for three years and yielded to the ray after seven weeks' treatment; whereas a scond case of sarcoma of the parotid gland, a recurrence after operation, was not affected at all. He suggests that it might be an idiosyncrasy to the ray.

Dr. Gibson, of Birmingham, Ala., said that some of the best results accruing from the treatment with the ray were in cases of melano sarcoma. A case in point was cited, in which improvement took place rapidly until the patient voluntarily left the sanitarium while still under treatment. We must learn what kind of a ray to use, the frequency and duration of the exposure, in order to obtain good results.

Dr. J. Rawson Pennington, of Chicago,

cited a case of cancer of the rectum in which a colostomy had been performed, with only temporary relief, in which the x-ray was used with good results, and exhibited a special tube which he had designed for such work.

TREATMENT OF THREE CASES OF CANCER, ONE CASE OF TUBERCULOSIS AND SEVEN CASES OF RODENT ULCER AND LUPUS.

Dr. G. P. Girdwood, of Montreal, Canada, reported that in one of the cases of cancer so treated all the symptoms disappeared. The patient's condition was improved considerably, altho a recurrence is probable. The tumor mass was replaced by a soft, pliable tissue, and a healthy growth leaving a cicatrix. The cases of ulcer and lupus were remarkably benefited. The same is true of the case of tuberculosis. The author exhibited photographs and skiagrams illustrating the condition of the patients before and after treatment. In many of them it was well nigh impossible to discover the seat of the original lesion.

THE TECHNIQUE OF TREATMENT OF MALIGNANT GROWTHS.

Dr. J. N. Scott, of Kansas City, Mo., the author, said that the apparatus used should be powerful enough to excite the largest tube to its fullest capacity with a full control of the current. He never applies the ray strong enough to produce necrosis, which is apt to irritate and stimulate that part of the growth not yet destroyed. His results are much better when the case is treated every day. The first exposure is not longer than four minutes. This is gradually increased to eight until a reaction appears, when the time of exposure is again reduced. The growth is exposed from as many directions as possible. The general condition of the patient must be watched and all his functions kept active. The x-ray will cure a certain per cent of cases and improve nearly all. It is far superior to the knife in that the original tumor as well as the metastasis can be treated at the same time, thus preventing any further spread. It is also applicable where the knife could not be used. The author described an apparatus which he invented to prevent the possibility of producing a burn on other parts of the body or on the person of the operator. It consists of a large box which is suspended from the ceiling. It contains the tube the rays from which pass out thru an opening the size of which can be regulated by a series of shutters.

He prefers to have bad cases operated upon and immediately referred for treatment by the x-ray.

Dr. A. M. Phelps, of Battle Creek, Mich., suggested that, instead of operating and then using the ray, the growth be excised with a cautery knife, after the method used by the late Dr. Byrne, of Brooklyn. It lessens the possibility of reinfection of the healthy tissues.

Dr. C. N. Bibbins, of Watertown, N. Y., reported a case of carcinoma of the throat, involving the fauces and extending up into the nares. As much of the growth as possible was removed by a surgeon with the curet and cautery knife, after which the x-ray was used twice a week. At the end of four weeks it had healed entirely. The patient then disappeared and returned later with a recurrence. After thirty-eight treatments the growth again disappeared and the patient has since been well without any recurrence of the trouble.

Dr. Gordon G. Burdick, of Chicago, advises against the protection of the normal tissues when raying a carcinoma, except when the tumor is located on the face, when for cosmetic reasons alone a lead mask should be applied. The diseased tissue always breaks down before the healthy tissue.

Dr. Lester E. Custer, of Dayton, O., exhibited a screen which he devised to

prevent burning of the healthy tissues. It consists of a large metal stand with an arm in which is held a series of metal plates like the top of a water bath. The size of the opening can thus be regulated and the screen is freely movable in every direction.

RADIO-THERAPY IN PULMONARY TUBERCULOSIS.

Dr. Gordon G. Burdick, of Chicago, contributed this paper. He conducted a series of experiments with guinea pigs which were inoculated with virulent tubercle bacilli. Some of them were exposed to the action of the x-ray, with the result that they invariably outlived the pigs not exposed. Altho it was possible to inhibit or check a culture he did not succeed in killing the bacillus. In the cases of human tuberculosis which he has treated, a slight but certain improvement takes place and eventually a good recovery. That is, there was a cessation of the temperature, cough, night sweats and diarrhea, and a return of weight and strength. There was no recurrence of the disease, altho in a number of the cases tubercular bacilli were found in the sputum first raised in the early morning.

Hemorrhages were always promptly controlled. Cases of fibroid tuberculosis yield slowly. The consolidated areas in the lung clear up to a very great extent. Abdominal tuberculosis requires more prolonged treatment. In chronic tuberculosis there is a disappearance of the symptoms, but improvement in weight is slow. In mixed infections improvement is also slow and there is a great tendency to the development of toxemia. Joint tuberculosis, involving only the bones, offers the best results. Permanent relief cannot be obtained until complete ankylosis has occurred and nothing should be done with the x-ray until ankylosis is complete: The results obtained by the author in 43 cases of tuberculosis located in all parts of the body were very good. Only one of the cases died, a case of advanced general tuberculosis. It is not an exclusive method of treating tuberculosis of the lungs, but only a useful adjunct in the treatment. Unquestionably good results have been obtained with this treatment, but not an absolute cure.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Iowa, has treated twenty cases of pulmonary tuberculosis with the x-ray. Sixteen of them were considerably improved and four were completely cured, and have remained so for six years. In tuberculosis of joints his results have also been good, but he cautioned against the idiosyncrasy of the patient. In glandular tuberculosis the results have been less promising. Recurrence nearly always takes place.

Dr. Russell H. Boggs, of Pittsburg, Pa., reported six cases treated, all of them showing decided improvement, except one which died from an intercurrent affection. One of the cases has remained in good health for over a year and is absolutely cured.

Dr. Gibson, of Birmingham, Ala., said that he has seen many cases of tuberculosis which improved considerably under treatment, altho they were not cured, so that they could continue in comfort with their occupation. He believes that the x-ray is a most important and efficient means in the treatment of tuberculosis. In cases of mixed infection packing can be used to good advantage. It reduces the temperature, diminishes the cough and night sweats, and the patient gains rapidly in weight and strength.

Dr. Kraus, of Memphis, Tenn., reported two cases cured by exposure to the rays.

Dr. Phillips, of Cincinnati, O., in treating tuberculosis of the joints uses a static cataphoresis instrument, using such remedies as formaldehyd and creosote. He believes he gets better results than when the ray alone is used. He has just begun this method in tuberculosis of the lungs and thus far the results have been good.

X-RAY TREATMENT IN INTRA-ABDOMINAL AND OTHER DEEPLY LOCATED MALIGNANT GROWTHS.

Dr. Clarence E. Skinner, of New Haven, Conn., read a paper with this title. He states that the effect of the x-light on cancer was entirely due to its specific influence on the tissues. He reported 38 cases in which this treatment had been used with a varying result. There was a complete disappearance of the disease in three cases; a continuous reduction in size of the tumor in 15; temporary reduction with subsequent increase, ultimately resulting fatally, in one; complete apparent arrest in four; no effect demonstrable in the size of the tumor in 15; complete permanent relief of pain in 16; complete temporary relief in three; partial in eight; no relief in four; and in seven there was no pain. The general condition of the patient was improved in 14; temporarily in 8; no influence apparent in 9; in 7 the general condition was not noticeably impaired when patient applied for treatment. There was gain in weight in 6; no apparent influence in 32. Hemorrhage was lessened in 9; not influenced in 2; and no hemorrhage observed in 27. Toxemia of varying degree in 15 cases. In five cases there was no evidence of any benefit, and three of these cases discontinued treatment after two or three treatments. So that out of a total of 38 cases we have three apparent cures; 17 continuously benefited, and they are still improving with good prospects of an ultimate cure; 13 temporarily benefited; in two no benefit, and in three the treatment was discontinued by the patient regardless of any benefit. Every one of these 38 cases was an imoperable one because of advanced disease and offered a perfectly hopeless prognosis by any ther method of treatment.

Conclusions: 1. The pain of deeply seated cancers is removable by the x-light from slight amelioration to entire disappearance.

2. In many cases x-light is capable of exercising an influence on deeply seated cancers of sufficient intensity to remarkably retard the disease and thus prolong life.

3. In a certain proportion of cases it possesses the power to entirely overcome deeply seated malignant processes.

4. A small number of deeply seated processes exhibit absolutely no indication of being susceptible to the x-ray.

5. Phenomena indicative of toxemia not infrequently accompany the treatment of malignant diseases by the x-ray. This is due to the elaboration of toxic substances owing to the retrograde metamorphosis of the tissues which are insusceptible of regeneration.

The author made three applications weekly, three to five minutes at a time, taking into consideration the condition of the patient, the apparatus, and the result of the treatment.

Dr. J. P. Marsh, of Troy, N. Y., had a patient referred to him for hysterectomy because of a carcinoma of the cervix. He used the x-ray instead, applying it per vaginam and supra-pubic, alternately. After about thirty treatments there was an entire symptomatic cure.

Dr. J. Rawson Pennington, of Chicago, said that he found that among x-ray workers the best results are obtained when the lesion is a superficial one, because the rays can be brought to bear directly on all parts of the growth. This makes the treatment of deeply seated growths rather difficult and hence the results are not as good. To obviate this difficulty he has designed a special apparatus consisting of two brass hemispheres which are clasped together over the tube. The hemisphere opposite the target of the tube has a large opening in one end thru which the rays can pass. Around this opening is a flange to which any size and variety of speculum can be attached. To the second hemisphere is attached a handle which gives the

operator complete control of the tube and the rays can be directed anywhere on all parts of the growth. He prefers a high tube for deep-seated lesions.

Dr. J. N. Scott, of Kansas City, Mo., prefers to use the rays in these cases after the patient has been operated upon by the surgeon, and he begins the x-ray treatment as soon after the operation as possible. It hastens the healing process considerably if the work is done carefully. Hemorrhage is also quickly stopped.

DIAGNOSIS OF CALCULI BY THE X-RAYS.

Dr. Russell H. Boggs, of Pittsburg, Pa., considered this subject. He said that the x-ray is the only means by which calculi can be diagnosed absolutely. The symptoms are often very obscure and point to many conditions other than calculi. Even minute particles of uric acid can be radiographed. Many gallstones have not been radiographed because of the location of the gallbladder, the changes in position to which it is constantly subjected by respiration, and the position of the gallstone. When radiographing for gallstones we should use a large amperage for a short time. The apparatus must be a suitable one and the preparation of the patient is as essential as for a surgical operation. The time of exposure will vary with the size and condition of the patient, from two to eight minutes. A number of cases were reported and the skiagrams exhibited showing the results obtained by the author in this work.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Iowa, advised that when making a radiograph for renal calculi a plate large enough to cover both the kidneys and the ureter should be used, because sometimes the stone may be located in the ureter and would otherwise not appear in the skiagram. The plates should always be examined first to make sure that they are free from spots, air bubbles, or any other defects which might be mistaken in the skiagram for a stone. It is also advisable to make two exposures or to use two plates, for if a shadow appears in both plates in the same spot it is not a defect but a real shadow. Stones composed of cholestrin do not always throw a shadow and very often are very indefinite. The phosphatic stones usually throw a very distinct shadow.

Mr. W. C. Fuchs, of Chicago, believes that for a successful radiograph three things are necessary: a good plate, a good apparatus and a good tube. He emphasized the point made by Dr. Rudis-Jicinsky and described his methods of work, exhibiting a number of radiographs illustrating his remarks.

THE TECHNIQUE OF X-RAY THERAPY.

Dr. H. Preston Pratt, of Chicago, contributed this paper in which he considered, first, the nature of the x-ray and second, its application. He said to always use a soft tube and to crowd it, and use a tube high enough to penetrate the tissues to be treated. Never use a high tube near the body, because the discharge from the terminals produces muscular contractions which tend to carry any possible infection along the lymphatics. Never use a strong static breeze or sparks in skin cancers, as it is liable to make the general condition worse, altho there may be an improvement in the local condition. Never expose a large surface at one time, because of the large amount of effete matter thrown into the system, which may produce a fatal toxemia. Keep the eleminative organs active. Never expose the patient directly to the ray, but interpose a celluloid screen 1/32 to 1/16 inch in thickness. Before exposing render the part antiseptic. Never be afraid of an x-ray burn. Malignant diseases do better with an x-ray burn than without it.

Dr. R. V. Wagner, of Chicago, said that the x-ray emanates from the motion of the rarified air particles in the tube, and when that produces movement of the molecular structures in the tissues we produce a certain amount of waste. If more waste

is produced than can be absorbed by the tissues it accumulates and acts as an irritant, setting up an inflammation which is called an x-ray burn. The movement imparted to the tissues by this inductive action is the real benefit derived from the use of the x-ray.

The paper was very fully discussed from the physicists standpoint by Mr. C. H. Treadwell, Chicago; Dr. J. N. Scott, Kansas City, Mo.; Dr. T. P. Hall, Chicago; Dr. E. H. Grubbe, Chicago, and Dr. G. P. Girdwood, Montreal, Can.

Dr. Wm. Jordan Taylor, of Cincinnati, O., contributed a paper in which he related the sudden and unaccountable explosion or collapse of a tube, which very nearly resulted in serious consequences. The tube had not been in use for about fifteen hours and no current was passing thru it at the time. It was smashed into thousands of pieces which were thrown with great violence all over his laboratory.

Others of the gentlemen present related similar experiences, and one suggested that the tube be covered with silk or some other material which is pervious to the x-ray.

Dr. J. Rudis-Jicinsky suggested that the tube be placed in a box like that devised and constructed by Dr. Scott, of Kansas City, and that the opening in the box be closed by a piece of silk.

The following officers were elected for the ensuing year:

President, Prof. Arthur W. Goodspeed, Philadelphia.

Vice-presidents, Dr. John B. Murphy, Chicago; Dr. Wm. Jordan Taylor, Cincinnati, O.

Secretary, Dr. J. B. Bullitt, Louisville, Ky.

Treasurer, Dr. Weston A. Price, Cleveland, O.

Member of Executive Committe, Dr. Ralph R. Campbell, Chicago.

EDITORIAL.

World's Fair Congresses.

The President of the Exposition Company has announced the organization of World's Congresses to be held in St. Louis during 1904. Howard J. Rogers, Chief of the Department of Education, is to be the Director of Congresses. The Advisory Board to work in conjunction with him is as follows: Chairman, Nicholas Murry Butler, President of Columbia University, New York City; William R. Harper, President of the University of Chicago; R. H. Jesse, President of the University of Missouri; Henry S. Pritchett, President of the Massachusetts Institute of Technology, and Herbert Putnam, Librarian of Congress.

The duties of this Advisory Board will be more exacting than usually fall to the lot of advisory bodies. Upon their recommendations will be determined the number and extent of the Congresses, the emphasis to be placed upon special features; the prominent men invited to participate, the character of the programs and the methods for successfully carrying out the enterprise. No effort will be spared to give the series of Congresses at this Exposition unity and connected purpose and make their published proceedings a valuable contribution to the world's literature.

It would be very desirable to have among these congresses one upon Electro-Therapeutics in its broadest sense. Nothing conduces more to the rapid adoption of approved methods than the full discussion of the same in a world's congress. Discussions undertaken by representative men show clearly to the world what is positively known, what is probable, and what is still guess work. We hope that the committee will give this question due consideration.

Meeting of the American Roentgen Ray Society.

The third annual meeting of the American Roentgen Ray Society was held at the Sherman House, Chicago, December 10th and 11th, 1902, the president, Dr. G. P. Girdwood, presiding.

The meeting was remarkable for the large attendance, the uniform high quality of the papers, and the great interest manifested in the papers and the discussions which followed. Not less remarkable was the unanimity of opinion regarding x-ray therapy and its various methods of procedure. The papers were nearly all practical in character, and showed that the workers in this line of electro-therapy are in almost complete agreement regarding the effects of the rays, the advantages that have been already secured from their use, and the directions in which further investigation should be prosecuted.

Dr. Arthur W. Goodspeed, of Philadelphia, was elected president for 1903.

Over 80 members were admitted, and the society has on hand to begin the work of the year about $500. The proceedings of the meeting are to be published in book form so that each member will receive a copy of all the papers read.

The Executive Committee are to be congratulated upon their success in providing a program. Only one paper was (on account of the absence of the writer) read by title.

Correspondence.

DR. H. P. PRATT:

I have been treating two cases of consumption. Have given twelve treatments. How long treatments can I give and what distance should the tube be kept from the patient? I have been giving seventeen inches distance. How far away do you have the tube when treating cancer? Does the patient feel the heat from the tube? A. F. R.

[The first treatment for tuberculosis should be very short, particularly if the patient is in an advanced stage of the disease; say five minutes at a distance of 15 to 20 inches. This distance may be gradually lessened and the length of time increased, as the patient begins to improve. The limit will depend entirely upon the condition of your tube, and the resisting power of the patient. In treating cancer begin in the same way, but if the cancer is small, and particularly if very malignant, begin with seven or eight minutes exposure at ten inches and gradually increase the time. It is seldom necessary to use a tube closer than 10 inches but put it closer if you cannot otherwise obtain sufficient intensity of the x-rays. There is no sensation from the tube, unless it becomes very hot by using a strong current.—Editor.]

EDITOR AMERICAN X-RAY JOURNAL:

How do you fix a static machine for the sinusoidal current? What is it used for? How do you get the "static induced current"? Do you use the jars for the charge and insulation? S. A.

[To obtain the sinusoidal current hang the small jars on the sliding rods; attach flexible conductors to the outer coatings of the small jars. The sinusoidal current is obtained between the ends of these flexible conductors when the sliding rods are such a short distance apart, say one-half inch, that a rapid stream of sparks passes between them. The sinusoidal current stimulates tissue changes, and is used for chronic inflammations, absorption of exudates, non-malignant tumors, local infections, etc. The sinusoidal current is a static induced current. For a charge and for insulation the jars are useless.—Editor.]

EDITOR AMERICAN X-RAY JOURNAL:

I have a patient that has muscular twitchings of the left side of the face. What treatment would you give with static machine? In sunlight days of summer sometimes it draws the side of his mouth out of shape. I seem to be doing him very little good so far. I also have a patient with chronic sciatic rheumatism of ten years' standing.

The leg has atrophied some and he has a pronounced hitch in his gait. How do you treat such with static current? W. E. C.

[A more accurate diagnosis is required before deciding upon treatment for the twitching. For temporary relief try the sinusoidal current from the small leyden jars, with a small spark gap, over the facial nerve.

Locate, if possible, the seat of the trouble. It may be in the nerves, muscles, or joints. The best treatment is the interrupted galvanic placing the kathode along the sciatic nerve. With the static machine use the sinusoidal with large jars; and if good results are not obtained soon, alternate this treatment with the direct current using kathode sparks.—Editor.]

EDITOR AMERICAN X-RAY JOURNAL:

You may be aware that we did not learn in our brief course all that it was possible to know regarding the use of our machines. I received a small German tube, known as No. 7, which acted nicely for a time, but it now shows the ray in but a part of tube—a portion near the anode giving a very different light and it very frequently "flickers" and goes entirely out for a few seconds. Please explain and put me right.

A. R. V.

[Your tube has probably become too high for use. Bake it in an oven for an hour or two, taking care to heat slowly and cool slowly.—Editor.]

Is electricity of any use in the treatment of goitre? T. H.

[Yes. If the goiter is inflammatory use the anode breeze; if degenerative and soft, the kathode and the sinusoidal current; if degenerative and hard, or if malignant the x-ray.—Editor.]

At the January meeting of the Chicago Electro-Medical Society Mr. Edward B. Ellicott, City Electrician of Chicago, will read a paper on "The Relation of Electrolysis to Public Health," which will be discussed by Dr. H. P. Pratt, X-Ray Expert and Electrical Diagnostician of the law department of this city.

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A MANUFACTURER of Glass Plate Static Machines, in a late edition of this Journal, challenges our statement that two Mica Plates equal ten glass ones.

The same manufacturer exhibited at the Pan-American, a machine having twelve revolving plates, in competition with ours having two revolving Mica Plates, and received a bronze medal; ***we received a silver medal.*** He advertises that he received the only award for x-ray apparatus at the Pan-American, and challenges us to a trial.

Nevertheless, we accept the challenge and name the following conditions, the fairness of which is obvious!!

1. The test to be made at Chicago, Ill.

2. The Medical and Scientific Electricians who shall decide the contest are to be chosen, one by our opponent, one by ourselves, and the two to appoint a third.

3. The machine selected for the test shall have been sold in the open market by the respective contestants within two years, and shall be selected from the offices of parties now using the same or trying to do so. We, to furnish the machine manufactured and sold by our opponent, he, to furnish any four-plate Mica Static Machine which has been sold by us. It is understood that these machines shall not be broken or otherwise injured, and that each party shall have six hours prior to the test to produce necessary adjustments for making the machine work at its best, but not to replace or add parts.

4. The results to be published in this Journal.

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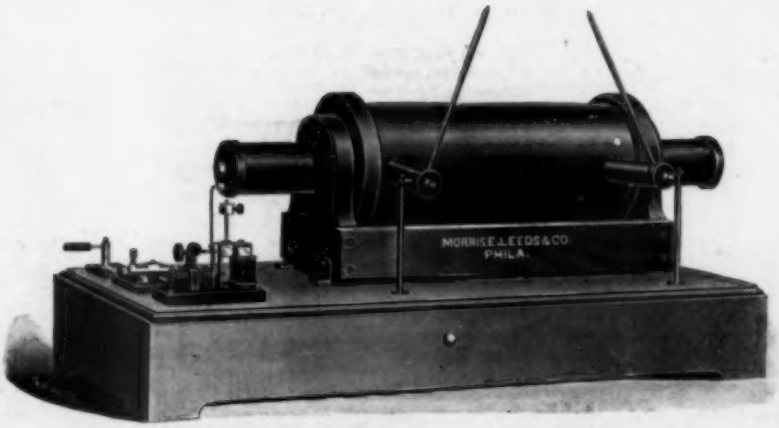

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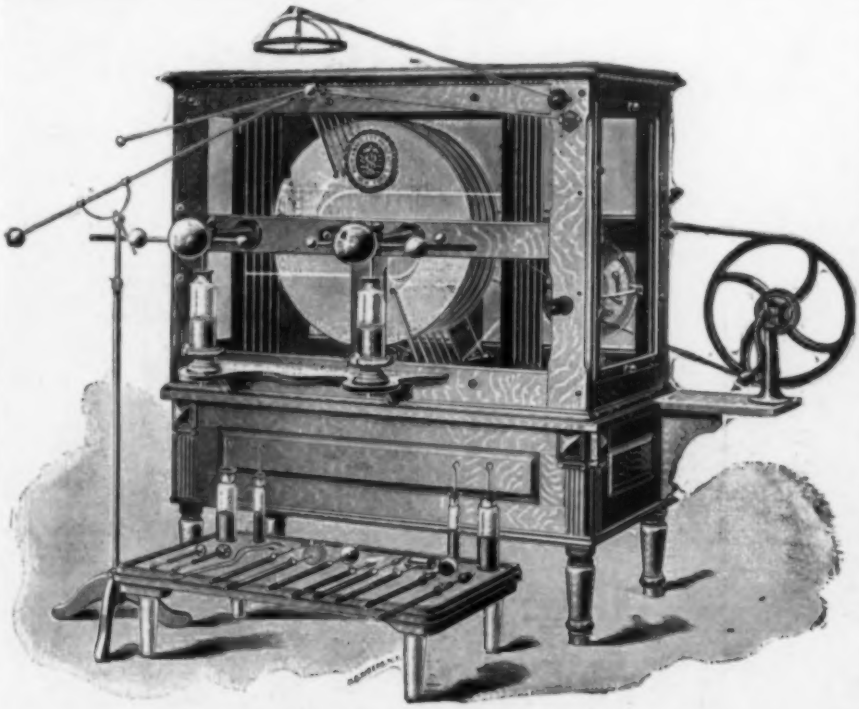

WASHINGTON, D. C., January 21, 1902.

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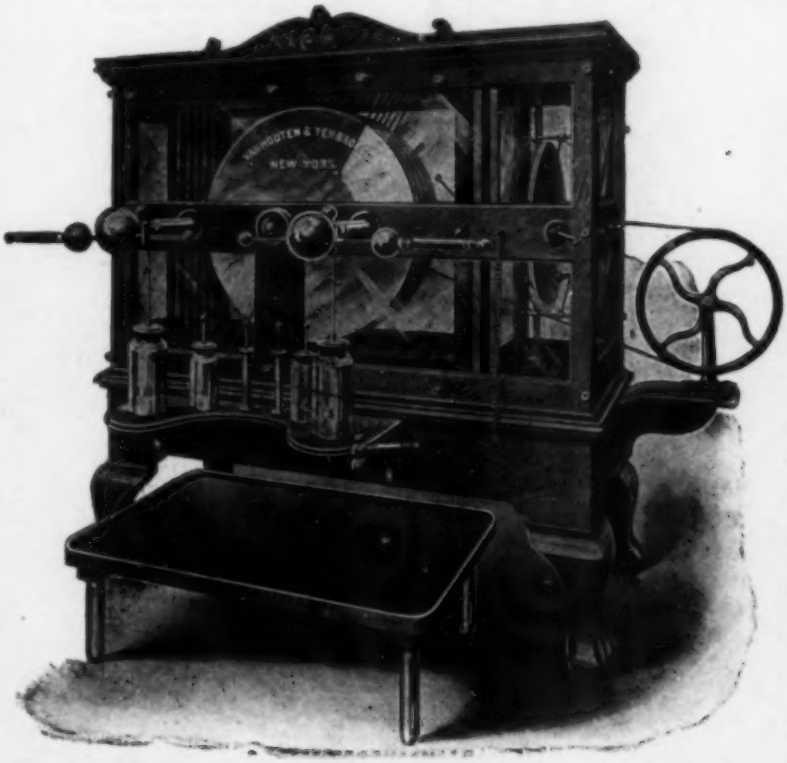

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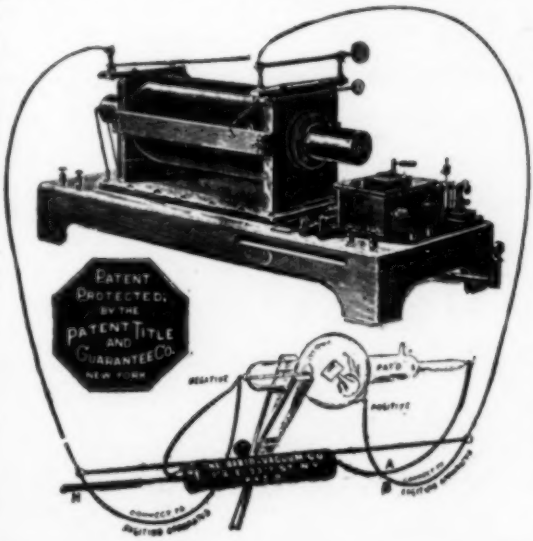

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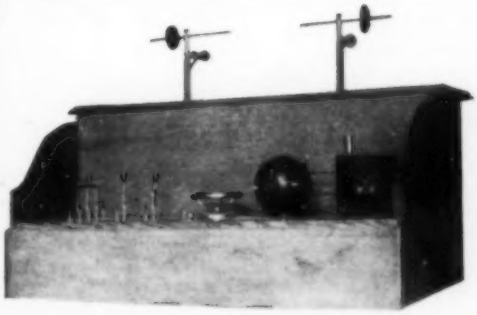

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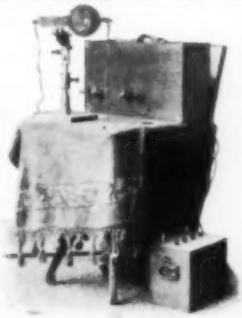

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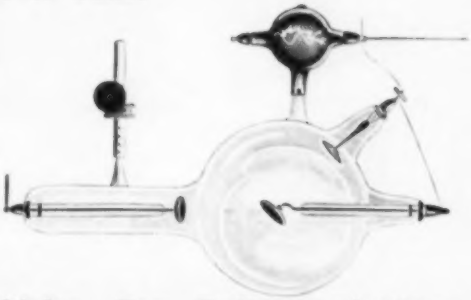

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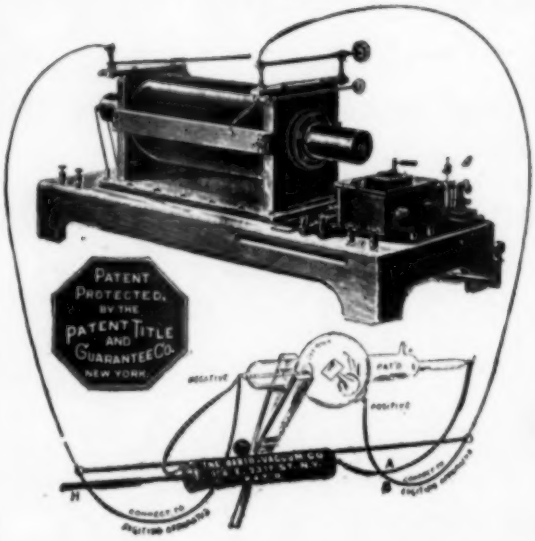

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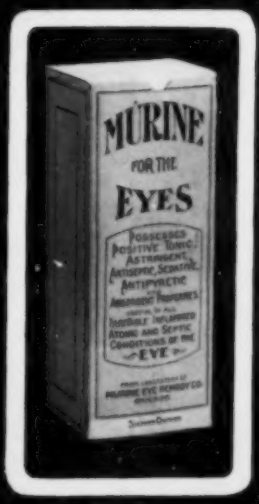

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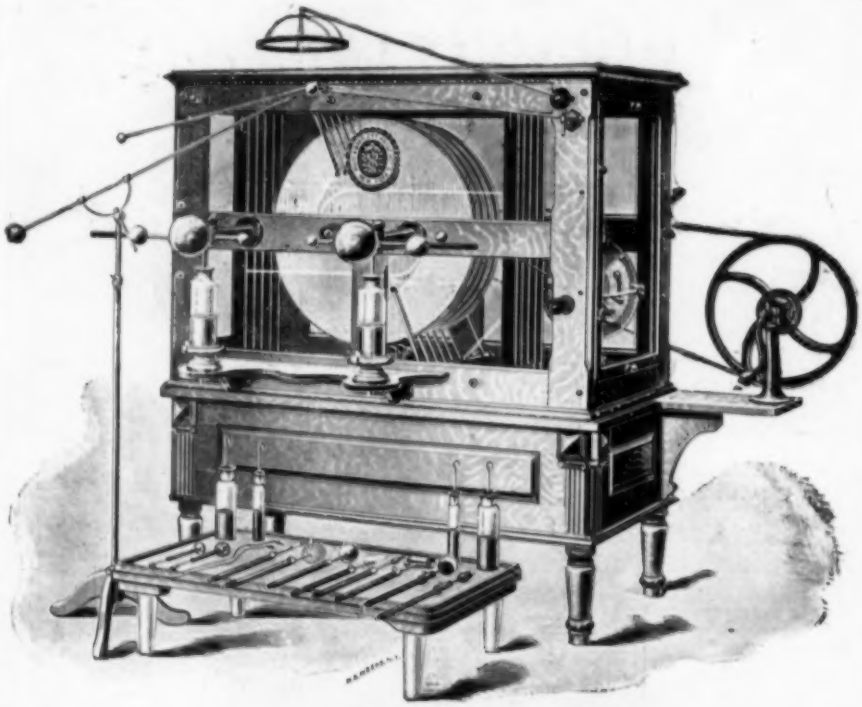

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DR. HENRY E. WAITE, Pres. Waite & Bartlett M'f'g Co.

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The Children's Hospital.
The U. S. House of Representatives.
Dr. F. A. Gardner (two outfits).
Dr. C. H. Heron.
Dr. H. Krogstad.
The Barnes Hospital, U. S. Soldiers' Home.

Yours very truly, Z. D. GILMAN.

N. B.—This is a copy of letter received by us from our agent at Washington, which speaks for itself. Yours truly,

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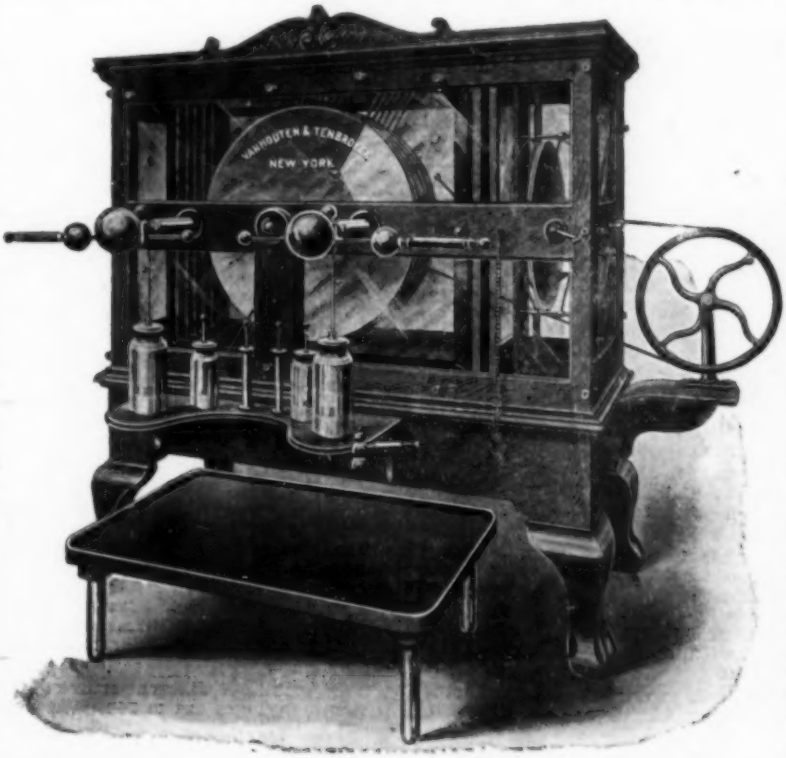

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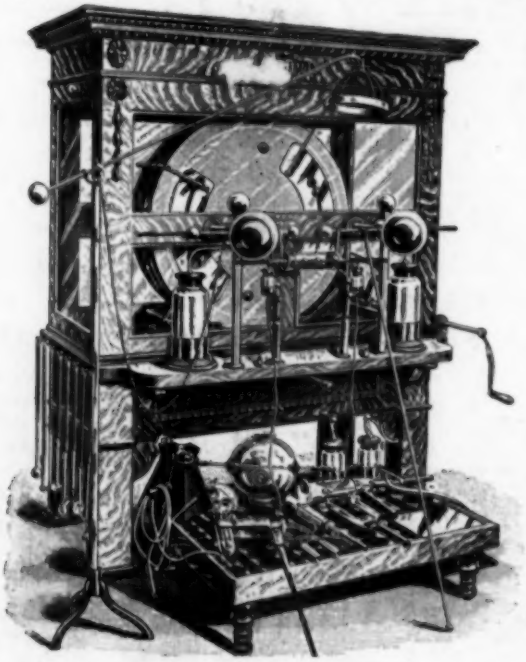

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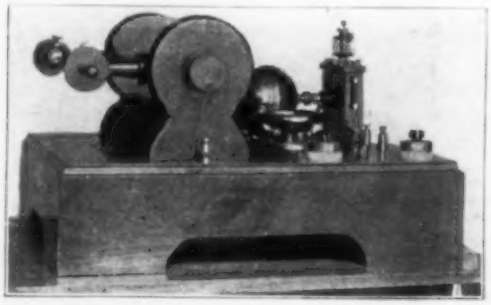

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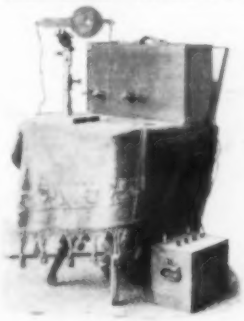

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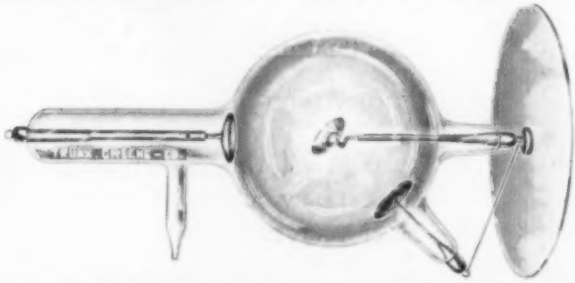

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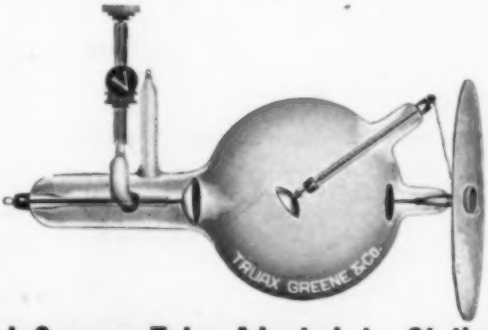

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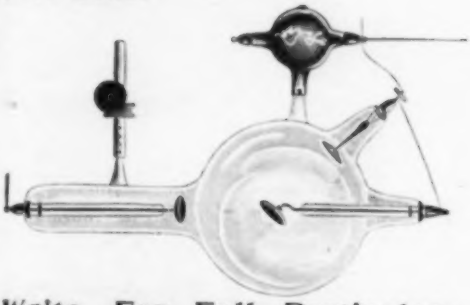

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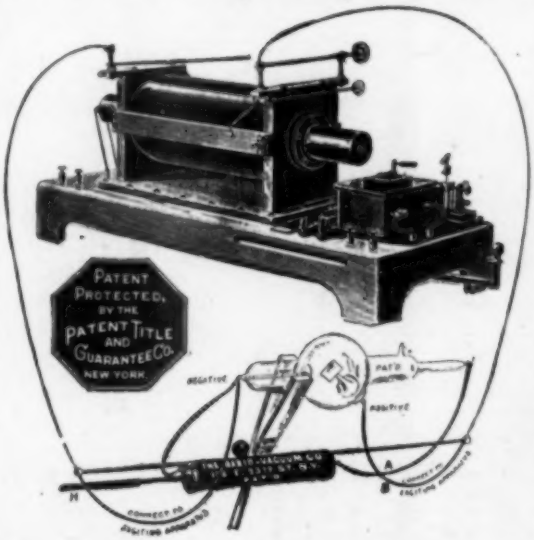

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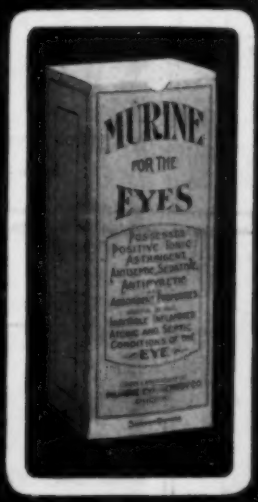

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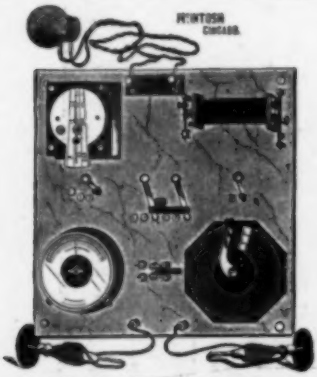

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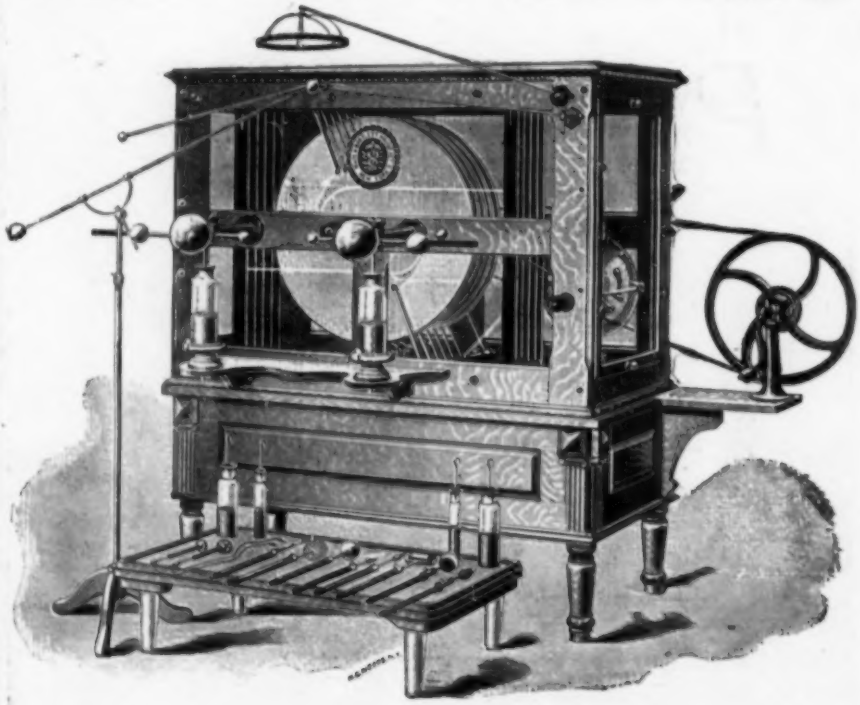

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Yours very truly, Z. D. GILMAN.

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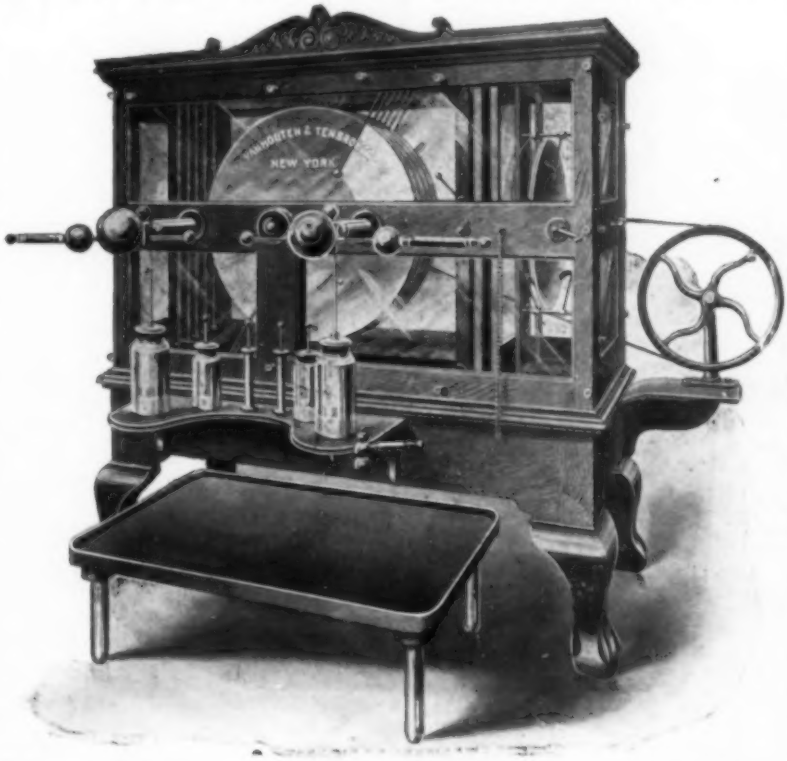

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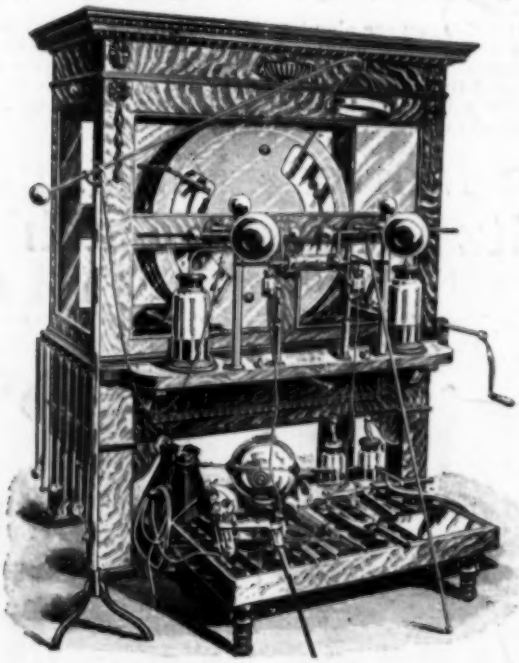

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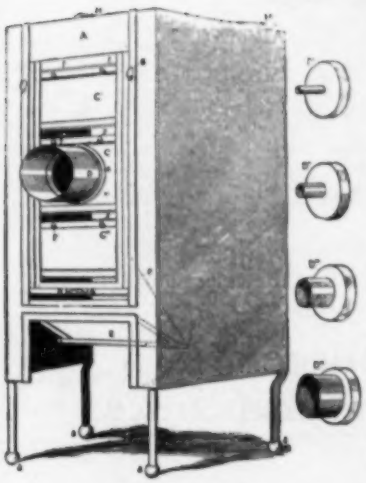

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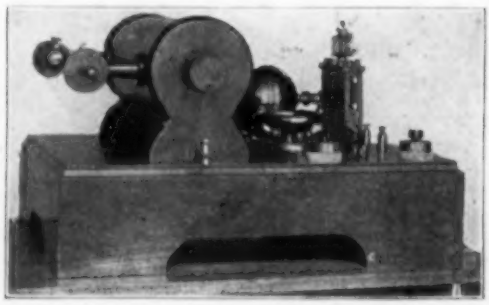

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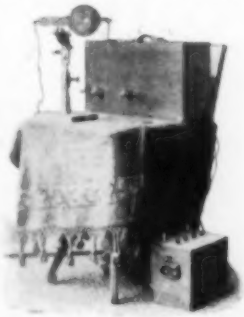

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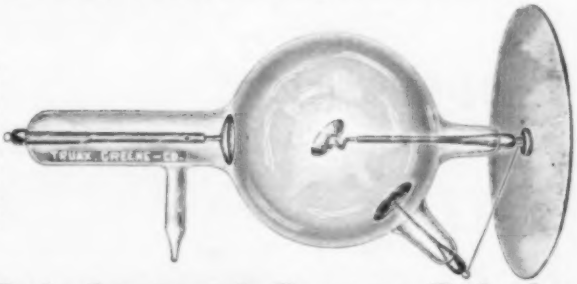

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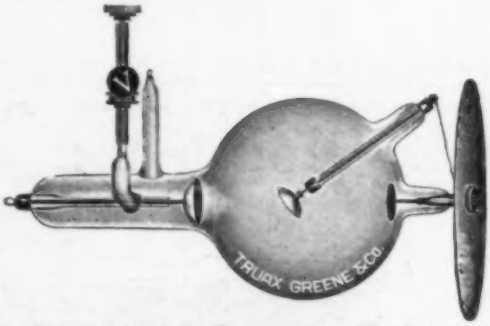

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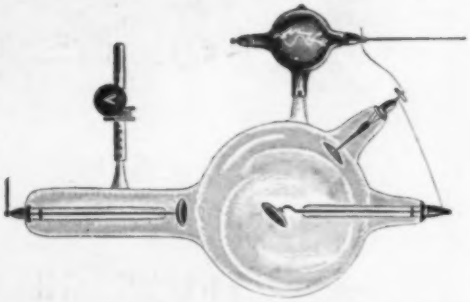

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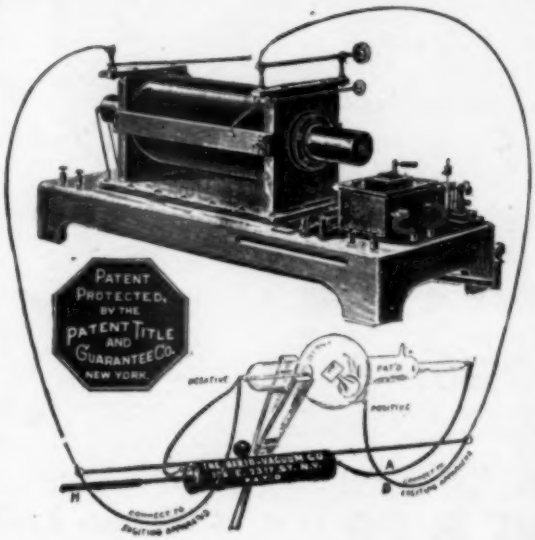

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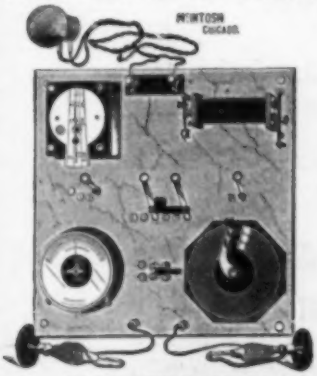

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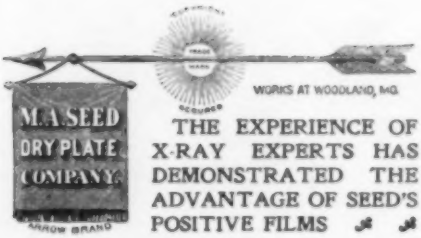

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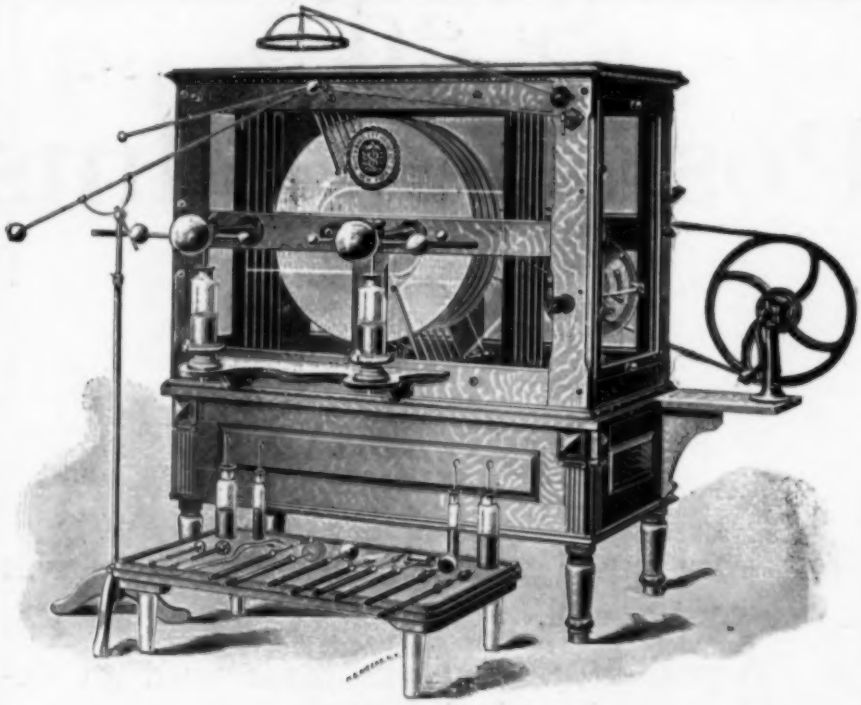

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The Barnes Hospital, U. S. Soldiers' Home.

Yours very truly, Z. D. GILMAN.

N. B.—This is a copy of letter received by us from our agent at Washington, which speaks for itself. Yours truly,

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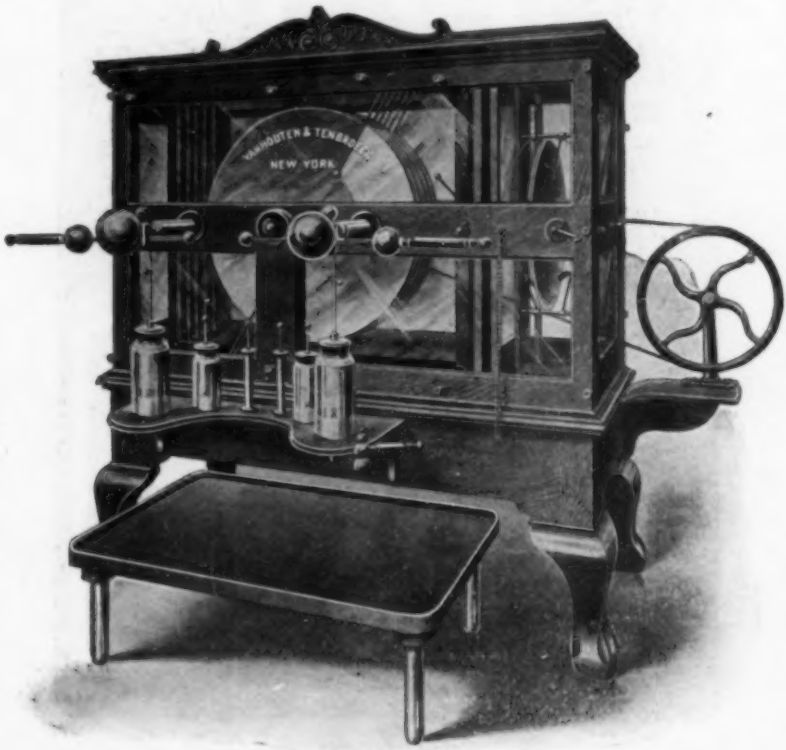

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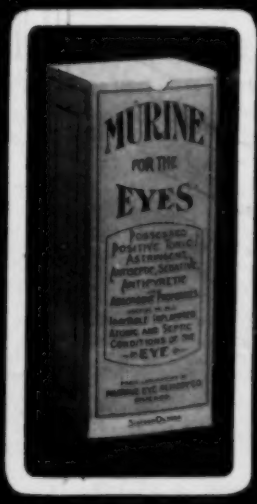

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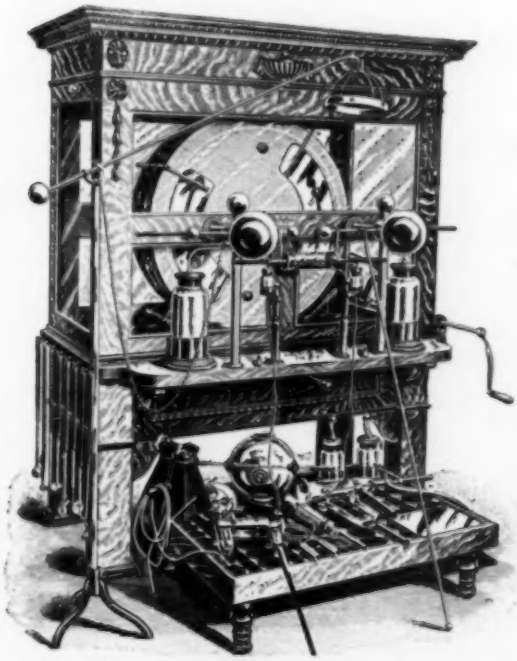

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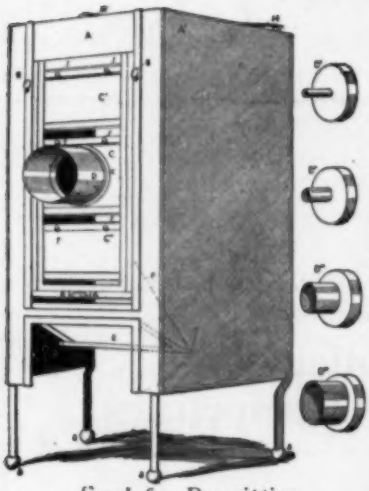

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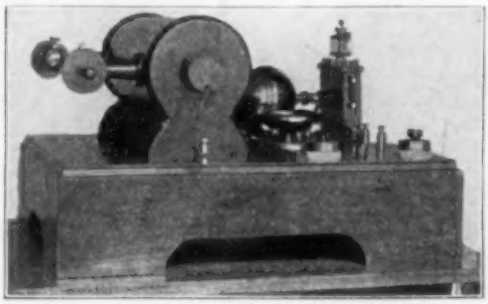

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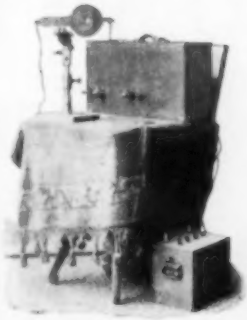

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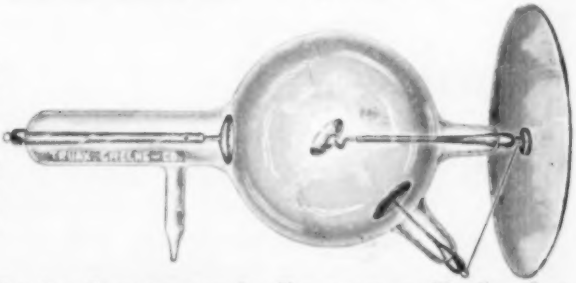

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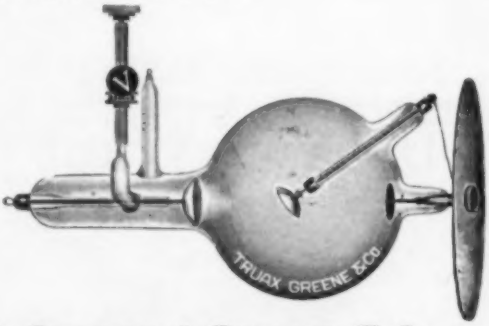

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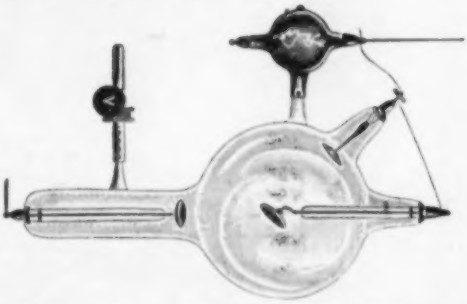

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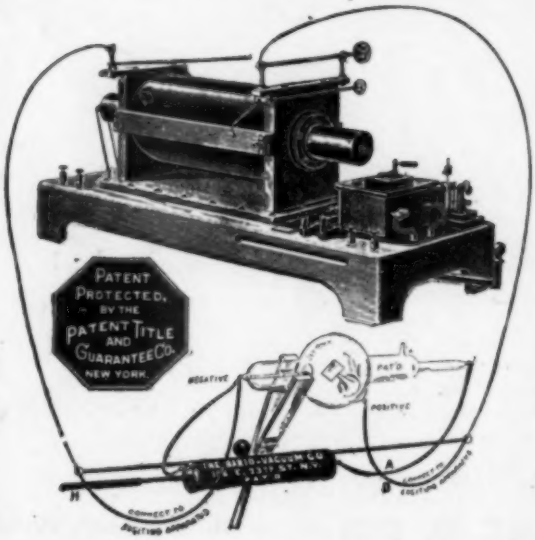

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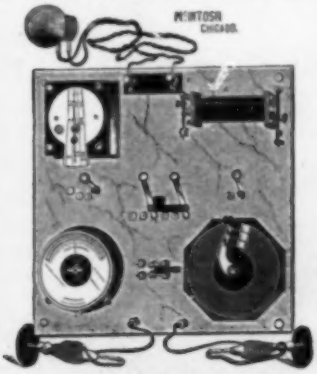

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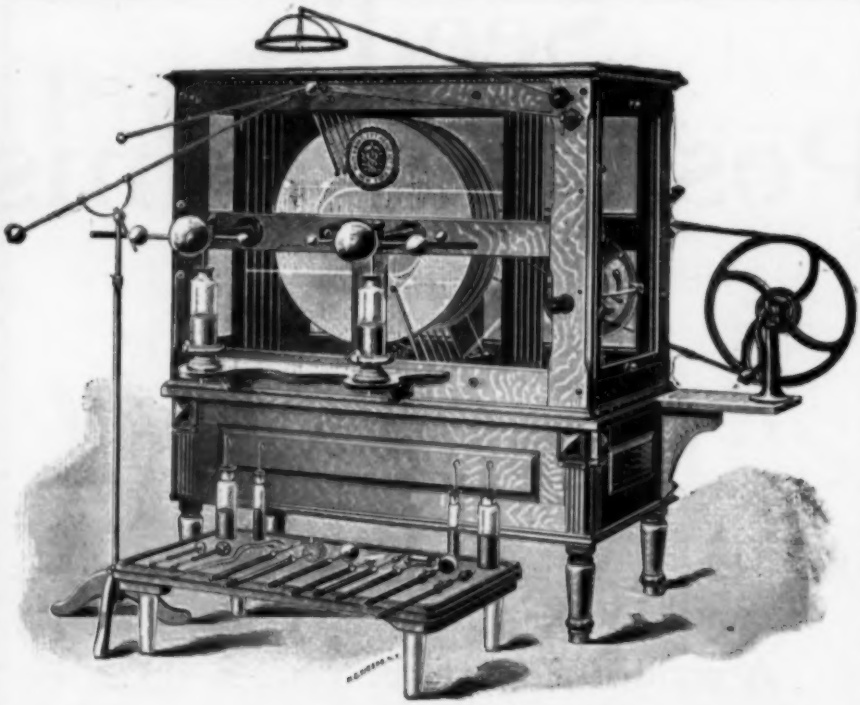

WASHINGTON, D. C., January 21, 1902.

DR. HENRY E. WAITE, Pres. Waite & Bartlett Mfg. Co.

DEAR DOCTOR:—After three months of capable, unprejudiced, exhaustive labor and research, the authorities at the Barnes Hospital, U. S. Soldiers' Home, Washington, D. C., have given us an order for the Waite & Bartlett Mfg. Co. Static Electrical Machine and X-Ray Outfit which has been on trial there in competition with the Van Houten & Ten Broeck's (Otis, Clapp & Co.) apparatus.

Crucial tests, which are absolutely impartial, were made during the period the machines were on trial, because it was the purpose of those in charge of the matter to buy the best apparatus obtainable.

Simultaneously with that trial, another investigation was in progress at the Children's Hospital in this city, where the same makes of apparatus were in full operation, and this institution also concluded that the Waite & Bartlett Mfg. Co. equipment was the best, and we likewise received their order for the complete outfit.

These orders are the outcome of painstaking investigation, and the victory of the Waite & Bartlett Mfg. Co. in both cases is one to be proud of, for their apparatus is thus stamped as the best now in the market, both for therapeutic purposes and X-Ray work.

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Dr. Robt. Reyburn.
Dr. H. H. Hawxhurst.
The Children's Hospital.
The U. S. House of Representatives.
Dr. F. A. Gardner (two outfits).
Dr. C. H. Heron.
Dr. H. Krogstad.
The Barnes Hospital, U. S. Soldiers' Home.

Yours very truly, Z. D. GILMAN.

N. B.—This is a copy of letter received by us from our agent at Washington, which speaks for itself. Yours truly,

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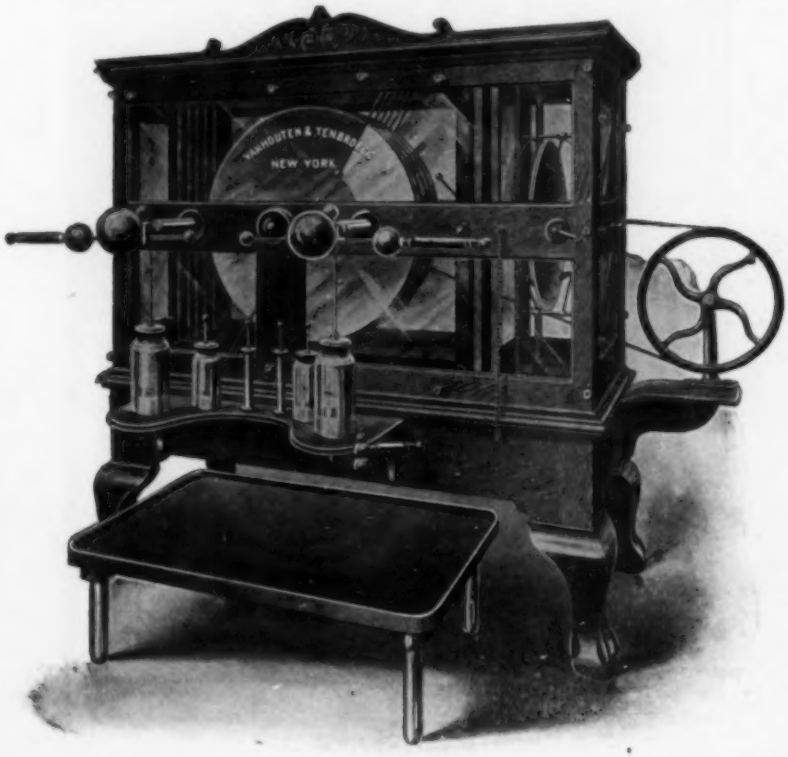

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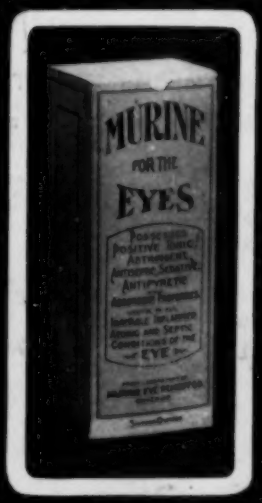

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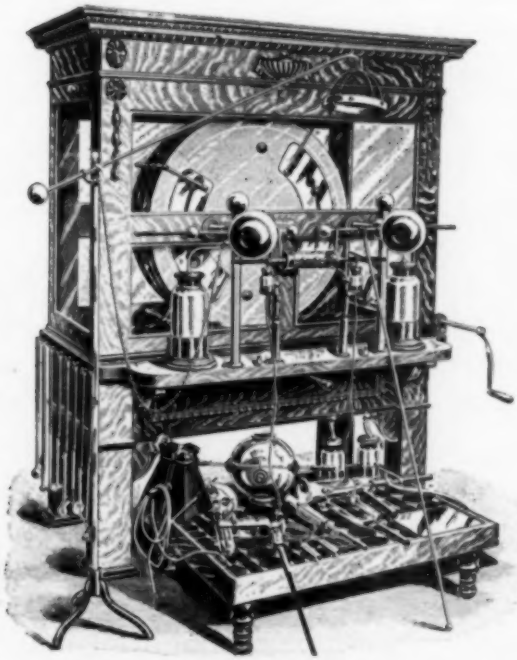

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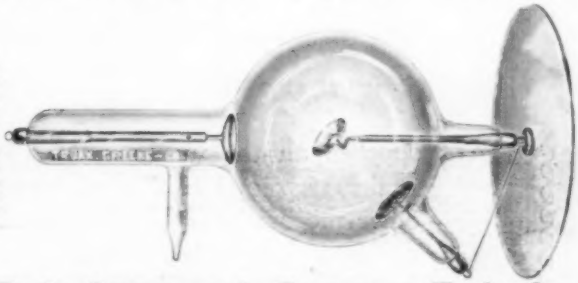

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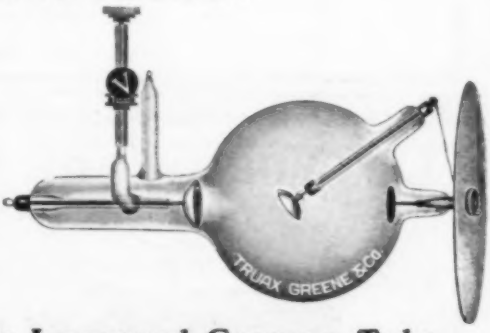

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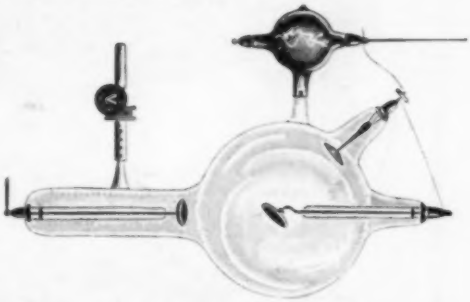

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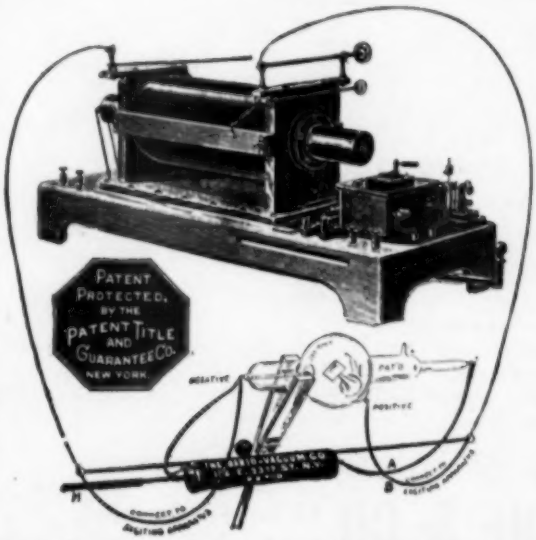

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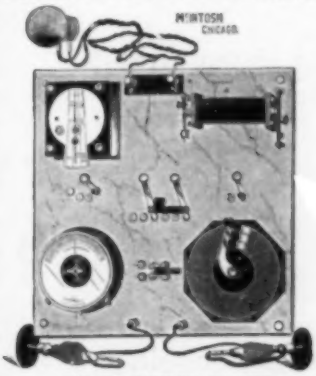

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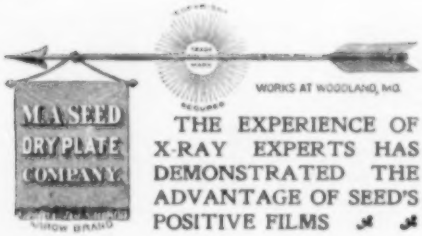

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1. They can be used as negatives or as positives equally well.
2. A positive print can be made with an exposure of one-half to three seconds, according to the density of the negative.
3. Developing the positive takes one minute, fixing five minutes. No tedious waiting, as in printing out papers.
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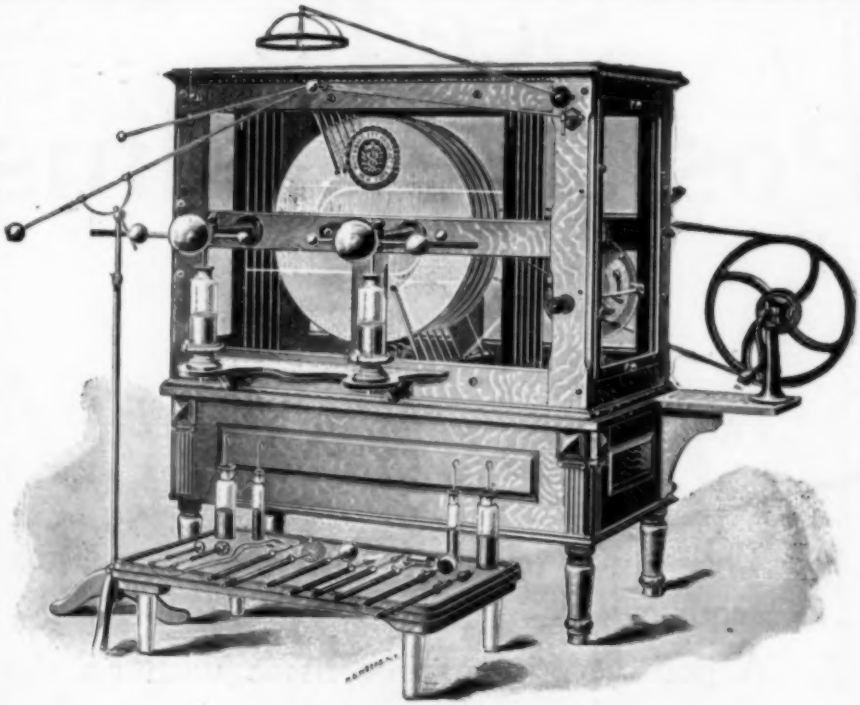

WASHINGTON, D. C., January 21, 1902.

DR. HENRY E. WAITE, Pres. Waite & Bartlett Mfg. Co.

DEAR DOCTOR:—After three months of capable, unprejudiced, exhaustive labor and research, the authorities at the Barnes Hospital, U. S. Soldiers' Home, Washington, D. C., have given us an order for the Waite & Bartlett Mfg. Co. Static Electrical Machine and X-Ray Outfit which has been on trial there in competition with the Van Houten & Ten Broeck's (Otis, Clapp & Co.) apparatus.

Crucial tests, which are absolutely impartial, were made during the period the machines were on trial, because it was the purpose of those in charge of the matter to buy the best apparatus obtainable.

Simultaneously with that trial, another investigation was in progress at the Children's Hospital in this city, where the same makes of apparatus were in full operation, and this institution also concluded that the Waite & Bartlett Mfg. Co. equipment was the best, and we likewise received their order for the complete outfit.

These orders are the outcome of painstaking investigation, and the victory of the Waite & Bartlett Mfg. Co. in both cases is one to be proud of, for their apparatus is thus stamped as the best now in the market, both for therapeutic purposes and X-Ray work.

Another fact to prove the excellence of the Waite & Bartlett Mfg. Co.'s apparatus is that there have been eleven of their Static Machines sold recently in Washington, the purchasers being as follows:

The U. S. Senate.
Dr. F. E. Gibson.
Dr. Robt. Reyburn.
Dr. H. H. Hawxhurst.
The Children's Hospital.
The U. S. House of Representatives.
Dr. F. A. Gardner (two outfits).
Dr. C. H. Heron.
Dr. H. Krogstad.
The Barnes Hospital, U. S. Soldiers' Home.

Yours very truly, Z. D. GILMAN.

N. B.—This is a copy of letter received by us from our agent at Washington, which speaks for itself. Yours truly,

WAITE & BARTLETT MANUFACTURING CO.

108 East Twenty-Third Street NEW YORK.

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